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NOTES ON THE SUBGENERA OF METOPIUS WITH A SYNOPSIS OF THE SPECIES OF CENTRAL AND SOUTHERN CHINA

(Hymenoptera, Ichneumonidæ)

BY CHARLES D. MICHENER

University of California, Berkeley

With the exception of a few relatively common forms, specimens of *Metopius* are rather rarely collected. Nevertheless, many species exist, distinguished by numerous and relatively constant characters, as demonstrated by Clémont (1929) in his revision of the Palearctic species. The European species of the genus whose habits are known are parasites of Lepidoptera.

I—Subgenera

The genus *Metopius* was described by Panzer (1806), who included two species, *M. vespoides* (Scopoli) [=*necator* (Fabricius)] and *dissectorius* (Panzer). Viereck (1912) designated *vespoides* (Scopoli) as the genotype. Clémont (1929) apparently believed that Panzer had included three species, *dissectorius* (Panzer), *micratorius* (Fabricius) and *necatorius* (Fabricius) [=*necator* (Fabricius)]. Although placing *necator* as a synonym of *vespoides* without comment on page 349, Clémont stated in his introduction that he regarded this synonymy as not fully established, and therefore redesignated the genotype as *Ichneumon micratorius* Fabricius, a species *not* included in the genus by Panzer at the time of his original description. Even though the identity of Panzer's *vespoides* with that of Scopoli is not definitely established (Clémont suggested that the former may be the same as *M. brevispina* Thomson), Clémont's genotype fixation is out of order, and the genotype of *Metopius* must remain *Sphex vespoides* Scopoli, as originally designated by Viereck.

Clémont, following his own genotype fixation, uses the subgeneric name *Metopius* for a group of species including *micratorius* (Fabricius), and describes a new subgenus, *Peltopius*, for *vespoides* (Scopoli) and its relatives. It is evident from the foregoing that *Peltopius* must fall as a synonym of *Metopius s. str.*,

being isogenotypic with it, and that a new name must be erected for the *Metopius s. str.* of Clémont. For this group, the name *Clémontia* is here proposed. The following is a bibliographical summary of the subgenera of *Metopius*.

1. *Metopius* Panzer, 1806, Krit. Rev. d. Ins. Deutschl., 2:78.
   Type species: *Sphex vespoides* Scopoli, designated by Viereck, 1912, Proc. Ent. Soc. Wash., 14:176.
   Peltastes Illiger, 1807, in: Rossi, Fauna Etrusca, 2nd Ed., p. 55.
   Type species: *Ichneumon necatorius* Fabricius [=*Sphex vespoides* Scopoli], designated by Curtis, 1824, Brit. Ent., 1:4.
   Peltopius Clémont, 1927, in: Schmiedeknecht, Opusc. Ichneum., fasc. 44:3461.
   Type species: *Sphex vespoides* Scopoli, designated by Clémont, 1929, Konowia, 8:347.
2. *Peltocarus* Thomson, 1887, Deutsche ent. Zeitschr., 1887:196.
   Type species: *Metopius croceicornis* Thomson, designated by Viereck, 1914, U. S. Nat. Mus., Bull. 83:112.
3. *Ceratopius* Clémont, 1927, in: Schmiedeknecht, Opusc. Ichneum., fasc. 44:3461.
   Type species: *Ichneumon dissectorius* Panzer, designated by Clémont, 1929, Konowia, 8:408.
4. **Clémontia** Michener, new subgenus.
   Metopius Clémont, 1927, in: Schmiedeknecht, Opusc. Ichneum., fasc., 44:3461.
   Metopius Clémont, 1929, Konowia, 8:365.
   Type species: *Ichneumon micratorius* Fabricius.

All of the American species which I have studied [*M. bellus* Cresson, *nevadensis* Cresson, *montanus* Cresson, *pollinctorius* (Say), and an apparently new species] belong to the subgenus *Clémontia*.

II—Species of central and southern China

Several authors have already described species of *Metopius* from various parts of the Orient, primarily from Japan, but with the exception of the widely distributed *M. rufus* Cameron, these forms are not represented in the Chinese material before me.

All of the species treated in the subsequent part of this paper belong to the subgenus *Ceratopius* Clémont, which is, at least in so far as the species known to me are concerned, divisible into two distinct groups, as shown in the first dichotomy of the following key. The possible propriety of a fifth subgeneric name is thus indicated.

KEY TO THE CENTRAL AND SOUTHERN CHINESE SPECIES OF METOPIUS

1. Dorsal carinæ of first abdominal tergite strongly elevated, so that the tergite, viewed from the side, has the upper surface strongly angulate at the summit of the subvertical anterior face; basal area of propodeum closed behind; posterior lateral angles of propodeum formed by an elevated angle on a carina; outer hind tibial spur about as long as apical width of hind tibia; first tergite with distinct longitudinal supraspiracular carina on each side 2

—. Dorsal carinæ of first abdominal tergite not strongly elevated, so that the tergite, viewed from the side, has the upper surface rounded and the anterior face subhorizontal; basal area of propodeum open behind; posterior lateral angles of propodeum low and rounded; outer hind tibial spur longer than apical width of hind tibia; first tergite without supraspiracular carinæ 5

2. Fourth abdominal tergite longer than broad; abdomen strongly blue, its pale markings much reduced ..... *metallicus*

—. Fourth abdominal tergite broader than long; abdomen feebly metallic 3

3. Areolet of fore wings small, with a long petiole; posterior lateral angles of abdominal tergites three to five yellow ..... *gressitti*

—. Areolet of fore wings not or hardly petiolate; tergites one to four with complete or nearly complete pale apical fasciæ 4

4. Lateral ocellus separated from eye by nearly the ocellar diameter; propodeal areola broadest near middle, posterior end rather narrowly rounded ..... *quadrifasciatus*

—. Lateral ocellus separated from eye by about one-half the ocellar diameter; propodeal areola broadest near posterior end, which is broadly rounded ..... *vandykei*

5. Fifth and sixth abdominal tergites shorter than apical widths, each with a distinct posterior yellow band ..... *rufus browni*

—. Fifth and sixth abdominal tergites about as long as apical widths, almost entirely black ..... *uchidai*

Metopius (Ceratopius) quadrifasciatus Michener, new species

This is a species with feebly metallic abdomen, and complete yellow fasciæ on the first four abdominal terga.

Female: Length 11 mm. *Head* black; facial shield margined with yellow, more broadly so laterally than at the ends; sides of face yellow to a point well above antennal sockets; cheeks receding immediately behind the eyes; facial shield longer than broad, widest at upper end, upper margin feebly convex except laterally, lower margin separated from anterior margin of clypeus by distance equal to about two-thirds of basal width of mandible; facial shield coarsely punctate, especially medially, punctures separated by considerably less than their diameters; clypeus below shield

more finely but closely punctate; frons rather coarsely punctate, sparsely so near ocelli; lateral ocelli separated from eye margins by nearly ocellar diameter; antennæ dark brown above, paler brown beneath, under side of scape yellow, fourth segment about as long as broad; upper margin of swollen segment of maxillary palpi yellow. *Thorax* black, a small mesepisternal angle beneath tegula, anterior lateral ridges of scutellum, posterior margins of posterior lateral teeth of scutellum, and large transverse median spot on metanotum yellow; lower lateral regions of pronotum shining and impunctate, with about three longitudinal carinæ, uppermost longest, impunctate area continued above it; mesoscutum irregularly punctured, notalices elongate, very weakly impressed; mesepisterna coarsely and closely punctured, punctures separated by much less than their diameters, dorsal process of mesepisterna thin and inconspicuously differentiated from disc, sternauli deeper posteriorly than anteriorly, rather finely and sparsely punctate anteriorly; scutellum coarsely and irregularly punctured, slightly depressed along longitudinal median line, with sides diverging slightly posteriorly, depressed anterior portion with five longitudinal carinæ, posterior lateral angles rather elongate and acute; fore wings with costal margin dusky, the dusky band narrow and inconspicuous basad to the stigma, but broad enough distad to it to include the entire marginal cell, areolet narrowed to a point toward costal margin, but not petiolate, the distocostal side being conspicuously longer than any other side; stigma black; metapleura shining, rather coarsely and sparsely punctate, punctures separated by about their diameters; fore and middle legs dark brown, infuscated, apices of femora and outer sides of fore tibiæ pale yellow; hind legs black, tibiæ and apices of femora dark brown, apices of femora each with a small yellow spot on outer side; hind tibial spurs hardly longer than width of tibia at apex; first four hind tarsal segments about as long as tibia; propodeum with costulæ distinct, areola with a longitudinal, median, impunctate line, posterior end of areola rather narrowly rounded, closed, areola broadest medially, where it gives off a carina on each side which divides to form a small, distinct, triangular area on each side, immediately above the strongly angular posterior lateral angle of the propodeum; carinæ bounding petiolar area on the sides weak. *Abdomen* black with feeble bluish or purplish metallic reflection, posterior margins of first four tergites yellow, the band on fourth tergite broadest, occupying nearly one-third of the tergite; posterior margin of fifth tergite narrowly and irregularly yellowish; abdomen coarsely punctate, second tergite more sparsely so than third and with sublateral, basal, impunctate areas; punctures of third and following tergites close, finer on posterior tergites; tergites three to six each with a weak and inconspicuous longitudinal median ridge; first abdominal tergite, seen from directly above, slightly broader than long, seen from side, strongly angulate above, the dorsal carinæ being strongly elevated to form

the angle, at which point they approach one another rather closely, behind which point they diverge slightly before converging toward the posterior margin of the segment; longitudinal supraspiracular carinæ distinct and complete; tubercle below anterior end of spiracle slender; second to fourth tergites slightly broader than long (third hardly so), their posterior lateral angles not or hardly produced posteriorly; fifth tergite broader than long (proportions of length to breadth of abdominal segments as follows: II, 15/19; III, 18/20; IV, 20/22; V, 18/21); pubescence of fifth and sixth tergites fuscous.

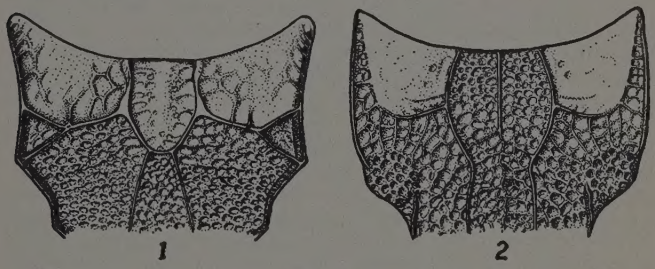

Figure 1. Dorsal and posterior surfaces of propodeum of *Metopius quadrifasciatus* Michener. Figure 2. Dorsal and posterior surfaces of propodeum of *Metopius uchidai* Michener. In these figures, no attempt has been made to show the lateral surfaces of the propodeum, which are visible to a certain extent from a posterior dorsal point of view.

Holotype, female: Tsin Leong San, east Kwantung, China, June 5, 1936 (J. L. Gressitt), on loan deposit in the California Academy of Sciences.

This species differs from *M. dissectorius* (Panzer) by the more elongate clypeal shield, which is more widely separated from the anterior margin of the clypeus, and the more elongate abdominal tergites. It differs from *M. fuscipennis* Wesmael by having only an inconspicuous keel on the abdominal tergites two to four, by the presence of a yellow band on the first tergite, and the absence of distinct bands on the fifth and sixth tergites. From *M. baibarensis* Uchida it differs in the shape of the first abdominal tergite, which is slightly broader than long, by the absence of a broad yellow band on the fifth tergite, and by the very feeble metallic reflection on the abdomen. This species differs from *M. purpureotinctus* (Cameron) and *areolatus* (Cameron) by the presence of strong, yellow, apical fasciæ on the first four, but not on the following abdominal tergites, as well as by other characteristics.

Metopius (Ceratopius) vandykei Michener, new species

This species is black, with feebly metallic abdomen and conspicuous fasciæ on the first four abdominal tergites.

Male: Length nearly 12 mm. *Head* black, facial shield completely margined with yellow, most broadly so laterally, sides of face yellow to point well above antennal sockets; sides of labrum and bases of mandibles with small yellow dots; palpi testaceous; cheeks receding immediately behind eyes; facial shield distinctly longer than broad, widest just above middle, upper margin feebly convex, lower margin separated from apex of clypeus by less than one-half basal width of mandible; facial shield coarsely punctate, especially medially, punctures separated by much less than their diameters; clypeus and frons more finely punctate, punctures of latter sparse near ocelli; lateral ocelli separated from eye margin by less than one-half their diameters; antennæ dark brown above, lighter beneath, scape and pedicel yellow beneath, fourth segment slightly broader than long. *Thorax* black, upper angles of mesepisterna, lateral basal ridges of scutellum, apical teeth of scutellum, transverse median area of metanotum, and posterior lateral angles of propodeum (feebly) yellow; lower lateral region of pronotum shining and impunctate, with a single complete longitudinal carina above which the impunctate area extends a short distance; mesoscutum coarsely and irregularly punctured, notalices complete, weakly impressed, closely punctate; mesepisterna coarsely and closely punctate, punctures separated by much less than their diameters, sternauli deeper posteriorly than anteriorly, dorsal mesepisternal process thin and scarcely separable from disc; mesoscutellum more coarsely punctate than scutum, depressed along longitudinal median line, lateral margins subparallel, although feebly convex, basal depression with three or four somewhat irregular longitudinal carinæ, posterior lateral angles robust, not strongly produced; wings nearly clear, feebly brownish along costal margin from stigma to apex of wings, areolet hardly petiolate, distocostal side hardly longer than basicaudal side, stigma black; metapleura coarsely punctate, punctures separated by less than their diameters; fore tibiæ and tarsi and apices of femora yellowish testaceous, outer sides of fore tibiæ yellow, remainder of fore legs dark brownish black; middle and hind legs black, tibiæ and tarsi dark brown, apices of femora with yellow spots, bases of middle tibiæ yellow; hind tibial spurs about as long as apical breadth of hind tibiæ, first four hind tarsal segments slightly shorter than hind tibiæ; propodeum with costulæ distinct, areola with longitudinal median, irregular, impunctate line, posterior end of areola broadly rounded, closed; areola broadest well behind middle, at which point it gives off a strong carina on each side, these carinæ dividing to enclose a small pit on each side just above the posterior lateral angles of the propodeum, which are elevated

and angular. *Abdomen* black, third and following segments feebly purplish, tergites one to four with apical pale yellow bands, those of first three narrowly broken medially, that of fourth broadest, and less than one-fourth as broad as length of segment, fifth tergite with narrow apical yellow band, wanting in median third; abdomen coarsely punctate, punctures of second tergite sparser than those of third, sublateral basal area of second nearly impunctate; punctures of third and following tergites quite close, feebly separated on sixth and seventh, and finer on these posterior tergites; tergites three to six with rather distinct, longitudinal, median ridge; fourth tergite broadest part of abdomen; first tergite distinctly broader than long, seen from above, seen from side angulate on dorsal surface, dorsal carinæ being strongly elevated to form the angle, and subparallel for a short distance behind angle; longitudinal supraspiracular carinæ distinct; posterior lateral angles of second and third tergites slightly produced posteriorly; second and third tergites slightly broader than long, fourth tergite more distinctly broader than long, and fifth conspicuously so (proportions of length to breadth of abdominal tergites: II, 16/19; III, 17/20; IV, 18/22; V, 15/21); pubescence of abdomen partly fuscous posteriorly.

Holotype, male, No. 5060, Calif. Acad. Sci., Ent.: Likiochai Forest Station, Honan, China, September 25, 1923, collected by Dr. E. C. Van Dyke, after whom it gives me great pleasure to name this species.

This species differs from *M. dissectorius* (Panzer) by the clearer wings, the more extensive abdominal maculations, and the shape of the propodeal areola, which is unusually broad and rounded posteriorly. It differs from *M. iyoensis* Uchida and *M. takabayashii* Uchida by the unwrinkled scutellum, from *M. arakawai* Uchida by the black basal part of the first tergite and other features of the abdominal markings, and by the sublateral, basal, nearly impunctate areas of the second tergite. *M. vandykei* may be distinguished from *M. hakiensis* Matsumura and *M. sapporensis* Uchida by the yellow scutellar teeth and the almost entirely black hind femora, from the former also by the absence of a yellow mesepisternal area, and from the latter by the longitudinal, median, impunctate band on the areola.

Metopius (Ceratopius) metallicus Michener, new species

This large and elongate species is characterized by the strongly metallic blue abdomen and the much reduced pale maculations.

Male: Length nearly 15 mm. *Head* black, facial shield broadly margined with yellow, sides of face narrowly yellow to a point well above antennal bases; labrum with yellowish dots laterally; mandibles each with a small, sub-basal yellow spot; palpi yellowish; cheeks receding immediately behind eyes; facial shield about one and one-half times as long as broad, widest in upper one-half which is parallel sided, upper margin feebly convex, lower margin separated from apex of clypeus by a little over one-third basal width of mandible; facial shield coarsely punctate, especially medially, punctures separated by much less than their widths, closest laterally; clypeus more finely punctate than labrum or facial shield; frons slightly more finely punctate than facial shield, impunctate adjacent to ocelli; lateral ocelli separated from eye margin by about one-third ocellar diameter; antennæ blackish above, dark brown beneath, under side of scape yellow, fourth antennal segment broader than long. *Thorax* black, tegulæ a little brownish; lower lateral parts of pronotum shining and impunctate with three longitudinal carinæ, the uppermost longest, impunctate area continued above it anteriorly; mesoscutum rather coarsely and irregularly punctured, notalices feebly indicated by slightly depressed and more coarsely and closely punctate lines; mesepisterna coarsely and closely punctate, punctures separated by considerably less than their diameters, finer in sternauli than elsewhere, sternauli narrower and deeper posteriorly than anteriorly; dorsal process of mesepisterna thin and inconspicuously differentiated from disc; mesoscutellum distinctly more finely punctate than mesoscutum, feebly depressed along midline posteriorly, sides parallel posteriorly, slightly diverging toward the rear in the region immediately behind the basal depression, lateral apical angles robust, weakly produced, basal depression with four longitudinal carinæ; wings brownish, particularly dark along costal margin from basal vein to apex, including the entire marginal cell, areolet not petiolate, but with a very short side on the marginal cell, distocostal side longer than any other, stigma black; metapleura irregularly rather finely punctate, shining, punctures not close; fore legs dark brown, tarsi, anterior sides of tibiæ, and apices of femora pale yellow; middle legs black, tibiæ and tarsi dark brown, apices of femora pale yellow; hind legs black, with minute transverse yellowish line at apices of femora; hind tibial spurs but little longer than apical width of tibiæ; first four hind tarsal segments slightly shorter than hind tibiæ; propodeum with costulæ distinct, areola without distinct longitudinal median line, posterior end rather narrowly rounded, closed; areola broadest behind the middle, but nearly parallel sided in front of this broadest point, giving off, behind the middle on each side, a carina which divides to enclose a triangular space just above the strongly angular posterior lateral protuberances of the propodeum. *Abdomen* strongly metallic purplish blue beyond the first tergite, which is black; tergites two to four with posterior lateral

angles yellow, and with inconspicuous, narrow, brown, apical bands between these yellow areas; abdomen coarsely punctate, more finely so posteriorly, punctures close on first tergite, fairly close on others; tergites two to seven with a longitudinal median dorsal carina; first tergite about as broad as long seen from directly above, seen from side angulate on upper side as a result of elevation of dorsal carinæ to form angles, carinæ converging rather strongly and evenly from these angles to the posterior margin of the tergite, longitudinal supraspiracular carinæ distinct and complete; second and third tergites feebly produced posteriorly at the sides, second about as long as broad, third and fourth slightly longer than broad, fifth broader than long, sixth and seventh distinctly broader than long (Proportions of length to breadth of abdominal tergites: II, 19/20; III, 22/21; IV, 22/21; V, 19/23. These segments appear to the eye considerably more elongate than these measurements indicate.); pubescence of tergites four to seven partly fuscous.

Holotype, male: Yin Na San, east Kwantung, south China, June 15, 1936 (J. L. Gressitt), on loan deposit in the California Academy of Sciences.

This form differs from other species of the subgenus by the elongated abdominal segments. It differs further from *M. dissectorius* (Panzer) by the much longer facial shield, and from *M. maruyamensis* Uchida by the reduced maculations of the abdominal segments.

Metopius (Ceratopius) gressitti Michener, new species

This is a dark species, with the posterior lateral angles of the first five abdominal tergites yellow.

Male: Length about 11 mm. *Head* black, facial shield yellow with a large, longitudinally elongate, median brownish black area; sides of face, to point well above antennal sockets, yellow; labrum and lower part of clypeus brownish; mandibles with yellow area sub-basally; palpi yellowish; cheeks receding immediately behind eyes; facial shield longer than broad, widest a little above middle, upper margin feebly convex, lower margin separated from anterior margin of clypeus by distance equal to about two-thirds of basal mandibular width; facial shield rather coarsely punctate medially, punctures separated by less than their diameters; lower clypeus and frons a little more finely punctate than facial shield, frons sparsely punctate in region of ocelli; lateral ocelli separated from eye margins by a little less than ocellar diameter; antennæ dark above, lighter below, under side of scape and pedicel yellow; fourth antennal segment a little broader than long. *Thorax* black, brownish laterally, upper angle of mesepisterna beneath tegulæ and an-

terior lateral ridges of scutellum with small yellow areas; lower lateral region of pronotum shining and impunctate with about three longitudinal carinæ, uppermost longest, impunctate area continued above it; mesoscutum rather coarsely, irregularly punctured, notalices hardly evident; mesepisterna coarsely and closely punctured, punctures separated by much less than their diameters, dorsal process thin and inconspicuously differentiated from disc, sternauli as deep posteriorly as anteriorly; scutellum more coarsely and irregularly punctured than scutum, slightly depressed along longitudinal median line, lateral margins about parallel, posterior lateral angles robust and but slightly produced, basal depression with seven longitudinal carinæ; wings nearly clear except for a small, somewhat dusky area on costal margin of apex of wing, occupying apical half of marginal cell and adjacent portions of wings; areolet small and long petiolate, distocostal side longer than any other; stigma black; metapleura coarsely punctate, punctures separated by somewhat less than their diameters; fore legs dark brown, apices of femora and outer sides of tibiæ yellow, rest of tibiæ and tarsi testaceous; middle and hind legs dark brown, coxæ infuscated, middle trochanters partly yellow, and apices of middle femora and bases of middle tibiæ yellow; hind tibial spurs but little longer than apical width of hind tibiæ; first four hind tarsal segments slightly shorter than hind tibiæ; propodeum with costulæ distinct, areola broadest in anterior half, which is about parallel sided, giving off a strong carina on each side behind midlle, these carinæ not dividing to enclose triangular spaces because of the reduction of their posterior rami; posterior lateral angles of propodeum elevated and angular, lateral carinæ of petiolar area weak. *Abdomen* black, almost without metallic reflection, tergites one to four with posterior lateral angles yellow, a brownish apical area uniting yellow areas on first tergite, fifth tergite with posterior margin, at the sides, narrowly yellow; abdomen coarsely punctate, second tergite more sparsely so than third, third and following tergites with punctures approximate and finer on posterior tergites; tergites two to six, especially four, with inconspicuous longitudinal median ridge; tergites all a little broader than long, fourth broadest (proportions of length to breadth of abdominal tergites: II, 15/19; III, 17/21; IV, 18/21; V, 16/21); first tergite, seen from side, angulate on upper surface, dorsal carinæ being strongly elevated to form angle, and subparallel for a short distance behind angle; longitudinal supraspiracular carinæ distinct and complete; posterior lateral angles of second and third tergites weakly produced posteriorly; pubescence of posterior tergites fuscous.

Holotype, male: Wong Sa Shui, south Kiangsi, south China, July 9, 1936, collected by my friend, Mr. J. Linsley Gressitt, in

honor of whom this species is named. It is now on loan deposit in the California Academy of Sciences.

This species differs from *M. dissectorius* (Panzer) and *M. baibarensis* Uchida by the absence of a strong blue reflection on the abdomen, which is broadest at the fourth instead of the fifth segment. It differs from the former also by the more elongate facial shield, and from the latter, as well as from *M. fuscipennis* Wesmael in the absence of complete abdominal fasciæ, and from *fuscipennis* at least in the shape of the first abdominal tergite, which is broader than long, and in the closely punctured mesepisterna.

Metopius (Ceratopius) rufus browni (Ashmead)

Metopius browni Ashmead, 1905, Proc. U. S. Nat. Mus., 29:117.
Metopius kakogawanus Matsumura, 1912, Thous. Ins. Japan, suppl., 4:100, pl. 47, f.18.
Metopius rufus Sonan, 1925, Taiwan Nojiho, 219, p. 13.
Metopius (Ceratopius) formosanus Clémont, 1929, Konowia, 8:410.
Metopius (Ceratopius) rufus Uchida, 1930, Jour. Fac. Agr. Hokkaido Imp. Univ., 25:248.
Metopius rufus f. *kakogawanus* Uchida, 1932, Jour. Fac. Agr. Hokkaido Imp. Univ., 33:208, 222.

Metopius rufus Cameron, with its subspecies *browni*, has an extensive distribution, from India to the Philippine Islands, and far north into China and Japan. Certain specimens included in the following list of localities are from regions outside of the distributional scope of this paper.

One female, Mei-hsien, east Kwantung, south China, July 19, 1936 (J. L. Gressitt); one female, Nanking, China, June 3, 1923 (E. C. Van Dyke); one female and two males, Tokyo, Japan, April 15, 1930, and June 2 and 3, 1931 (J. L. Gressitt). Previously reported from Hongkong.

The males here recorded from Tokyo agree well with Ashmead's description of *browni*, as well as with Uchida's notes on the male of *rufus*. The similarity of the descriptions of *browni* and *pulchripes* Cameron suggests that the male of the typical Indian *rufus* may be *pulchripes*.

Metopius (Ceratopius) uchidai Michener, new species

This is a strongly maculated, non-metallic form, with conspicuous yellow bands on the first four abdominal tergites, in

contrast to the almost entirely black apical portion of the abdomen.

Male: Length 13 mm. *Head* with face yellow, except for a small infuscated area on each side below facial shield, the yellow extending up on sides of face nearly to level of ocelli; labrum, large area on mandibles, palpi, and scape and pedicel except dorsal side yellow; cheeks feebly bulging behind eyes; facial shield longer than broad, widest above middle, upper margin convex because of a median angle, on each side of which the margin is nearly straight, lower margin separated from anterior margin of clypeus by distance equal to over two-thirds of basal width of mandible; facial shield rather finely punctate, punctures separated by a little more than their diameters except on the closely punctate median area; clypeus below shield fully as coarsely punctate as shield; frons very finely punctate, with fine transverse striæ; lateral ocelli separated from eye margin by a little more than ocellar diameter; antennæ black above, flagellum brown beneath, fourth segment of antennæ broader than long. *Thorax* black, with broad, elongate areas on posterior margin of pronotum adjacent to mesoscutum, anterior lateral areas and posterior half of scutellum, large median area of metanotum, longitudinal area beneath tegulæ and larger vertical area beneath it, and small spots on posterior lateral angles of propodeum bright yellow; lower lateral portions of pronotum shining and impunctate with four or five longitudinal carinæ, the upper ones reduced posteriorly, impunctate area not extending above uppermost carina; mesoscutum irregularly punctured; mesepisterna coarsely punctured, intervals between punctures less than their diameters, punctures of sternauli, which are shallower posteriorly than anteriorly, fine; dorsal mesepisternal process thickened and rounded; mesoscutellum closely punctured, more finely so than some parts of mesoscutum, lateral margins diverging posteriorly, lateral apical angles strongly produced into long points, basal depression with four longitudinal carinæ; wings brownish, with darker area occupying apical part of marginal cell and most of last (open) submarginal, areolet elongate, large, not or very briefly petiolate, distocostal margin but little longer than basocaudal margin, stigma light brown; metapleura coarsely and rather closely punctate; fore and middle legs yellow except for large brown areas on inner side of femora; hind coxæ black, trochanters yellow maculated with brown, femora black with yellow spot on either side at base and apex, tibiæ and tarsi dark brown, hind tibial spurs considerably longer than greatest width of tibia, first four hind tarsal segments about as long as hind tibiæ; propodeum with areola large, with longitudinal median carina, posterior end open; areola broadest in front of the middle, sides arcuate, giving off near middle, on each side, a carina which

soon disappears; regions laterad to areola with large, smooth, and polished area basally; posterior lateral angles of propodeum rounded. *Abdomen* black, not metallic, tergites one to four with broad apical yellow bands, those of tergites one to three broadest laterally, that of second tergite narrowest, middorsally occupying about one-fourth of the tergite, that of fourth broadest, occupying more than one-half of the tergite; posterior margins of tergites five, six, and seven very narrowly yellowish at sides; punctures of abdomen coarse, becoming finer posteriorly, close except on sixth and seventh tergites, where they are somewhat separated; tergites three and four with feeble longitudinal, middorsal ridge; first tergite longer than broad, upper surface rounded as seen in profile, dorsal carinæ weakened posteriorly, subparallel in posterior median region, elsewhere converging toward the rear; suprastiracular carinæ absent; second tergite slightly broader than long, third to fifth about as broad as long, second and third produced slightly posteriorly at sides; sixth tergite somewhat broader than long, seventh broader than long (proportions of length to breadth of abdominal tergites: II, 17/20; III, 21/21; IV, 21/23; V, 20/21).

Holotype, male: Nodoa, Hainan Island, China, June 19, 1935 (J. L. Gressitt), on loan deposit in the California Academy of Sciences.

A female, no doubt of the same species, is from Yim Na San, east Kwantung, south China, June 13, 1936 (J. L. Gressitt). It differs from the male, in addition to the usual sexual characteristics, thus:

Clypeus below facial shield, labrum, and mandibles dark reddish brown, the clypeus infuscated; dorsal posterior mark on pronotum reddish; fore and middle legs with femora except apices, inner sides of tibiæ, and parts of tarsi light reddish brown; hind legs with femora reddish brown, outer sides with black median area, yellow apical area, and minute yellow basal area; wings with apical dusky spot more conspicuous; abdominal tergites five and six with very narrow posterior margins reddish brown, tergite seven mostly reddish brown.

This species is possibly related to *M. kakiensis* Matsumura, from which it differs in the broad apical yellow band on the scutellum, the complete yellow bands on the first three abdominal tergites, and the apically dusky wings.

I take pleasure in naming this striking species for Dr. Toichi Uchida, in recognition of his extensive work on Oriental Ichneumonidæ.

NEW SPECIES AND RECORDS OF STRATIOMYIDÆ FROM PALEARCTIC ASIA

(Diptera)

BY MAURICE T. JAMES

Colorado State College, Ft. Collins

The Stratiomyidæ of Palearctic Asia have been studied during recent years by Matsumura, Pleske, Lindner, and others, but it is to Lindner that we are indebted for the comprehensive treatment of this family in his contribution to *Die Fliegen der Palæarktischen Region.* However, it is evident that much is yet to be known of the Asiatic fauna. In this paper, I am describing several new species and giving some new records which will extend our knowledge of these flies. The specimens collected by Thompson, Van Dyke, and Wright are in the collection of the California Academy of Sciences unless otherwise noted.

Subfamily Beridinæ

Hoplacantha japonica James, new species

Female. *Head* black, dull on face, strongly bright-purplish metallic on front; antennæ brown; proboscis bright yellow; palpi brown. Ratio of first and second antennal segments and flagellum 10:4:14; of face in middle, front above antennæ, and vertex through paired ocelli 7:8:18 (same units as antennæ); front gradually widening posteriorly. Eyes with dense but short brownish-black pile; face, front, and vertex with dense brownish-black pile which is as long as the first antennal segment; pile of occiput concolorous, but shorter. *Thorax*, including pleura, scutellum, and bases of scutellar spines, bright emerald green; scutellar spines yellow at apex; pile mostly moderately long, whitish yellow, but the dorsum with some pile similar in color and length to that of face and front. Coxæ black, trochanters brown, legs otherwise yellow, except that the terminal segments of front and middle tarsi and knees and tibiæ of hind legs are somewhat darkened, and hind basitarsi are white (other segments of hind tarsi missing in type). Wings hyaline; veins yellow at base, otherwise brown; stigma brown. Halteres lemon-yellow. *Abdomen* brownish-black, semi-metallic, luster coppery except at apex, where it becomes purplish; genital lamellæ yellow. Pile short, black, dense; that of sides and venter pale yellow, long at base, becoming somewhat shorter apically. Length, 6.5 mm.

Holotype, female, No. 5121, Calif. Acad. Sci., Ent., Kagoshima, Japan, March, 1912 (J. C. Thompson).

Related to *compta* Enderlein (Sikkim, India) and *flavicornis* James (Formosa); the wholly dark coxæ, however, will readily distinguish it. The abundant bushy pile of the head will further distinguish it from *flavicornis* and the coloration of the legs from *compta*.

HOPLACANTHA SOLOX Enderlein

Female, Kagoshima, Japan, March, 1912 (J. C. Thompson). The types are from Sapporo.

ALLOGNOSTA SINENSIS Pleske

Female, Nikko, Japan (Koebele). The types are from Szechuan Province, China.

SUBFAMILY GEOSARGINÆ

GEOSARGUS JANKOWSKII Pleske

Two females, Weisohn, Manchuria, August 30, 1923 (E. C. (Van Dyke); one female, Soochow, China, May 27, 1923 (Van (Van Dyke).

GEOSARGUS SPLENDENS Meig.

One male, Kobe, Japan.

GEOSARGUS MANDARINUS Schin.

Two males, one female, Nanking, China, April 21-30, 1923 (Van Dyke); one female, Soochow, China, May 27, 1923 (Van Dyke).

GEOSARGUS METALLINUS Fabr.

Female, Yalhenya, Pin-Chang Prov., Manchuria, August 1-15, 1939 (M. I. Nikitin). This species is reported as very common in India and the East Indies, but has not previously been recorded from the Palearctic Region. My specimen seems to differ in no way from Indian specimens.

Geosargus vandykei James, new species

Female. Front narrow, at its narowest point, somewhat less than the width of the third antennal segment, metallic green; vertex becoming purplish; face sub-shining black; callus above antennæ yellow, undivided. Proboscis dirty yellow. Antennæ black on first two segments, otherwise brownish-yellow, the arista be-

coming darker apically. Pile black on front and basal antennal segments, otherwise yellowish, that on face rather dense. Occiput with a prominent fringe of yellowish pile. *Thorax*, including pleura and scutellum, purplish, the pleura in part with a reddish cast; metanotum emerald-green; pile fairly dense, especially behind and below, pale yellowish, almost whitish. Coxæ, trochanters and femora deep black; front and middle tibiæ and tarsi brownish-yellow, the middle tibiæ darker; hind tibiæ and tarsi brownish-black, the tibiæ with an indistinct median pale ring. Wings almost uniformly brown, somewhat paler on posterior margin. Halteres brownish-yellow. *Abdomen* metallic purplish at base, otherwise bronze or coppery, the purple being more extensive ventrally; pile abundant and conspicuous, especially when viewed from behind, mostly grayish-white, but black on areas in the form of cross-bands just behind middle of segments (more extensive ventrally than dorsally) and at apex. Genital lamellæ blackish. Length, 17 mm.

Holotype, female, No. 5122 Calif. Acad. Sci., Ent., Tung Ko Forest Sta., Kiangsu province, China, June 12, 1923 (E. C. Van Dyke).

Close to the European *iridatus* Scop., to which it runs in couplet 13 of Lindner's key (*Die Fliegen*, p. 38-9); *iridatus*, however, is smaller and has the callus over the antennæ divided into two white spots, the wings less strongly infumated, the legs more extensively black, etc.

CHLOROMYIA MELAMPOGON Zeller

Male, Yalhenya, Pin-Chang Prov., Manchuria, August 1-15, 1939 (M. I. Nikitin).

MICROCHRYSA LAODUNENSIS Pleske

Male, Shanghai, China, August 3, 1926 (Mrs. Dora E. Wright); female, Mokansan, Che Kiang Prov., China, August 28, 1927 (Mrs. Wright).

PTECTICUS TENEBRIFER Walk.

Numerous records from Japan and China.

PTECTICUS AURIFER Walk.

Male, female, Nikko, Japan, July 30 and August 4, 1923 (Van Dyke); four females, Yen Ping, China, June 30 to August 13, 1917.

Subfamily Stratiomyinæ

Stratiomys anubis Wied.

Eight females, four males, Nanking, China, April 21 to June 11, 1923 (E. C. Van Dyke).

Stratiomys ruficornis pyrrhocera Lw.

Two males, two females, Mt. Ellurs, Nissa, Iran (Brandt).

Stratiomys lindneri James, new species

Female. *Head* black, except for the following yellow areas; posterior part of vertex and area behind it extending to the neck; a pair of spots above the antennæ, almost contiguous with each other and with eyes, and about half as high as front; and facial orbits extending almost from frontal spots to cheeks, and widening below. Pile of front and vertex variable, yellow to black, sparse; pile of head otherwise yellow, that on face and cheeks dense. Antennæ black; ratio of two basal segments and flagellum 50:10:65. Vertex flattened; front and vertex rugose; occipital orbits narrow, densely yellowish to whitish pollinose near eyes. *Thorax* black; scutellar spines and narrow apex between them yellow; pile dense, yellow, that on dorsum appressed or nearly so. Metanotal pile yellow. Legs black, knees, bases of tibiæ, and tarsi yellow, tarsi more or less darkened on apical segments. Wings brownish-yellow, paler apically and posteriorly. Halteres yellow. Abdomen black, marked with yellow; second segment with large lateral triangular markings which attain base of segment; third and fourth with linear rectangles, the pattern of which is variable, those on segment three sometimes being similar to those of two, and contiguous with them, those of four in the holotype expanded into a complete posterior band; fifth segment with a large median spot; lateral margins of dorsum and venter, and posterior margins of ventral segments, more or less expanded medially, yellow. Pile short, yellow, some black on black dorsal areas, short, somewhat longer at base and sides of dorsum and middle of venter. Length, 15-18 mm.

Male. Similar; head entirely black; pile of frontal triangle and of narrow strip between eyes black; eyes with scattered but fairly long black pile. Pile of thorax and abdomen much longer, that of middle of ventral segments especially long and dense.

Holotype, female, No. 25444, Mus. Comp. Zool., Takayama, Japan, August 22, 1931 (Gressitt). Allotype, male No. 25444, Mus. Comp. Zool., same data. Paratypes, female, Takayama, Japan, August 12, 1931 (Gressitt); male, Takayama, Japan, August, 1932; male, female, Kobe, Japan; female, Sumiyushi, June, 1909; two females, Kyoto, Japan, July 16, 1923 (E. C. Van Dyke).

Close to the European *S. furcata*; but in that species the yellow facial orbits are lacking, the spots above the antennæ are much smaller, the scutellum is extensively yellow, the mesonotum has considerable erect pile, the body pile is whitish, and the average size is apparently smaller. Dr. Lindner had seen one female which he considered a distinct subspecies of *furcata* (*Die Fliegen*, Stratiomyidæ, p. 61) but did not name. I believe this form is worthy of specific rank.

Stratiomys hispanica planes James, new subspecies

Male. *Eyes* bare. Antennæ black; apex of second segment brownish-yellow; ratio of two basal segments and flagellum 20: 6:28. Face, except median line, angle of oral margin, and a spot below lower angle of each eye, yellow; lower occipital orbits broadened, yellow; head otherwise black. Pile of face dense, silvery. *Thorax* black, pile dense, mostly appressed, silvery. Metanotal pile silvery. Scutellum and spines yellow; a large black triangular spot at base. Coxæ, trochanters, and femora, except apices, black; tibiæ yellow, each with a median black ring, most noticeable on hind pair; tarsi yellow. Wings very lightly infumated, veins yellow. Halteres pale yellow. Abdomen black, with prominent paired yellow spots on segments two to four, and a median unpaired one on segment five; those on segment two border broadly on the lateral margin, and reach the base of the segment, where they continue laterally half-way to base of first segment; those on segment three touch lateral margin only posteriorly, but are large, almost semicircular, and reach the basal fourth or fifth of the segment; those on four are similar, reach the basal third of the segment, and sometimes broadly join each other to form a continuous transverse band; that on five reaches the basal third of the segment. Venter yellow; first segment with a basal black marking on each side or a transverse basal band; third, fourth, and fifth each with a transverse black or brown basal band. Length, 8-10 mm.

Holotype, male, No. 5123, Calif. Acad Sci., Ent., Curum, 100 km. Bouchir, Iran. (Brandt). Paratopotypes, six males, same data.

Distinguished from typical *hispanica* chiefly by the smaller size and the abdominal markings, and from *h. cypria* Pleske by the abdominal markings and the bare eyes.

Stratiomys annectens James, new species

Female. *Head* in large part yellow; occiput, except orbits, vertex, upper three-fifths of front, an area at base of antennæ and extending over median third of face to oral margin, oral margin, and an area between lower corner of each eye and oral margin,

black. Pile of face and front scattered; yellow. Occipital orbits of approximately equal width throughout. Antennæ black; ratio of basal two segments and flagellum 18:6:35. Eyes bare. *Thorax* black; pile rather dense, appressed, yellow; metapleural pile yellow. Scutellum yellow, black on basal fourth; spines yellow. Coxæ, trochanters, and femora, except apically, black; tibiæ yellow, the hind pair with an indistinct brownish ring; tarsi apparently yellow, front and middle ones, however, damaged in type. Wings hyaline; veins yellow. Halteres yellow. Abdomen black, marked with yellow; second segment with a pair of lateral triangles which extend about three-fifths distance to base; third and fourth segments with almost linear markings at posterior angles; fifth segment with posterior margin and a small median triangle yellow. Venter black, posterior margins of segments yellow, that of second broadest and reaching base of segment medially. Length, 10 mm.

Holotype, female. Yalhenya, Pin-Chang Prov., Manchuria, August 1-15, 1939 (M. I. Nikitin); author's collection.

Related to the Asiatic *prezwalskii* Pleske; also to the Nearctic *currani* James and *laticeps* Lw., particularly the former. The black vertex and adjoining sclerite of the occiput will readily separate it from all three of these species. In Lindner's key it traces to *potamida* or *prezwalskii*, but does not fit either alternative.

HOPLODONTA VIRIDULA Fabr.

Numerous males and females, Yalhenya, Pin-Chang Prov., Manchuria, August 1-15, 1939 (M. I. Nikitin).

ODONTOMYIA STAUROPHORA Schiner.

Female, Hangchow, China, May 12, 1923 (E. C. Van Dyke); male, Nanking, China, June 20, 1923 (Van Dyke).

Male (apparently undescribed). *Head* black, except oral margin and a line extending from upper oral angle to antennal bases, which are yellow; antennæ yellow. Pile of face whitish, longer and denser than in female. *Thorax* black except following yellow regions: humeri; supra alar calli and small areas just anterior to them, extending about half-way to suture; scutellum, except very narrow base, and scutellar spines; a broad area on pleura, extending from propleura over upper part of mesopleura to ptero- and metapleura; and a somewhat isolated spot on upper part of sternopleura. Thorax rather thickly clothed with whitish pile and golden (on dorsum) to silvery (on pectus) tomentum. Femora and hind tibiæ blackish or brownish-black, except at narrow bases and apices; tarsi somewhat darkened apically; legs otherwise yellow. Abdomen as in female (cf. Lindner, *Die Fliegen*, Stratiomyidæ, Pl. IV, fig. 48).

The resemblance of the female to the Nearctic *O. cincta* is striking, but the male, if I have correctly interpreted it, dispels any doubt as to their distinctness. The female of *cincta* has different patterns on the third and fourth abdominal segments, and the thorax is more hairy.

Odontomyia atrodorsalis James, new species

Female. *Head* black except following yellow areas: two spots on front, along midfrontal suture, immediately anterior to unpaired ocellus; a considerable area, half width of face, below antennæ; and an area on each occipital orbit, below middle of eyes; limits of these areas not well defined. Antennæ, proboscis, and palpi black. First antennal segment somewhat longer than second; flagellum missing. Face rather broad, carinate. Head with rather dense white to yellow appressed pile; some erect pile on cheeks. *Thorax* black; scutellum narrowly yellow only at tip, the color extending some distance outside spines, however; spines yellow. Thorax densely yellow tomentose dorsally, pleura and pectus with abundant white pile, mostly appressed. Legs beyond trochanters yellow; femora more or less darkened on inner surface; last three or four tarsal segments blackish. Wings hyaline; strong veins brown; vein R_4 absent; M_1 long, but weak except at base; M_2 comparatively strong; M_3 developed only at base. Halteres yellow. *Abdomen* black above except narrow lateral and apical margin; venter yellow. Length, 7 mm.

Holotype, female, Yalhenya, Pin-Chang Prov., Manchuria, August 1-15, 1939 (M. I. Nikitin); author's collection. Paratype, female, same data but July 1-19, 1939.

O. tigrina is the only other palearctic species with a wholly black abdomen; but in that species, the face is rounded, R_4 is present, the coloration of the legs and venter is different, etc. The closest relatives are such species as *O. microleon* of Europe and *O. hoodiana*, *O. pubescens*, etc., of North America.

Subfamily Clitellariinæ

Nemotelus argentifer Lw.

Three females, one male, Curum, 100 km. Bouchir, Iran (Brandt).

Ephippium bergeri Pleske

Male, Yalhenya, Pin-Chang Prov., Manchuria, August 1-15, 1939. (M. I. Nikitin.)

Ephippium obtusum James, new species

Male. *Head*, including antennæ, entirely black; proboscis brownish-black. Eyes densely black-pilose. Occiptal orbits with silvery tomentum; proboscis white haired; head otherwise wholly black pilose, pile especially dense on face and cheeks. Ratio of first and second antennal segments, flagellum (excluding style) and style 8:5:16:8; style thick, blunt at apex, with short, black pile; segments of flagellum and style indistinctly separated. *Thorax*, including legs and scutellum, entirely deep black; yellow tomentose on dorsum, whitish on pectus; pile mostly black, rather short, moderately abundant; lateral spines short, somewhat longer than first antennal segment; scutellum slightly directed upward, spines on a level with scutellum, divergent, sharp, not club-like, about as long as first two antennal segments combined. Tarsi and apices of tibiæ, especially front and hind ones, densely yellow-pilose, so that in certain lights these members may appear yellow to the naked eye. Halteres yellow. Wings black, deepest along anterior margin; veins black; union of discal and fifth posterior cells almost punctiform. *Abdomen* black, broader than thorax, as broad as long; short black pilose on basal three and one-half dorsal and on first ventral segments, otherwise whitish-pilose, silvery at apex dorsally. Length, 12 mm.

Holotype, male, No. 5124, Calif. Acad. Sci., Ent., Kobe, Japan, May, 1909.

E. stylatum Brunetti, from Kangra Valley, India, is also a black species with a thick, blunt style; but it is smaller, the wings are gray, the knees yellow, etc. The other known species of *Ephippium* all have acute, slender, arista-like styles.

Subfamily Pachygastrinæ

Evaza japonica Lindner

Male (undescribed). Frontal triangle, except spot at apex, silvery pollinose. Thorax with longer pile than in female. Scutellum, except spines, almost wholly black, only a trace of yellow at apex. Halteres yellow. Abdomen with considerable black, as well as pale, pile above. Otherwise agrees with Lindner's description of female.

One specimen, Mt. Ishizuchi, Shikoku Al., Japan, July 14, 1933.

Discussion

The eastern Asiatic materal treated in this paper shows an interesting blending of European, American, and Oriental ele-

ments. The Oriental elements include *Hoplacantha japonica*, *Hoplacantha solox*, *Geosargus metallinus*, *Ptecticus tenebrifer*, *Ptecticus aurifer*, *Ephippium bergeri*, *Ephippium obtusum*, and *Evaza japonica*. All these either occur or have close relatives in the Oriental region. As to the genera, *Hoplacantha* is neither European nor Nearctic (Neotropical, however); *Ptecticus* is not European and the two species listed here are subgenerically distinct from the American species; *Ephippium* has one European and no American representatives.

The European elements, that is, species either occurring in Europe or having close relatives there, include *Geosargus splendens*, *Geosargus vandykei*, *Chloromyia melampogon*, *Stratiomys anubis*, *Stratiomys lindneri*, and *Odontomyia viridula*. To the great Holarctic fauna, with close relatives both in Europe and Nearctic America, belong *Allognosta sinensis*, *Geosargus mandarinus*, *Microchrysa laodunensis*, *Odontomyia atrodorsalis*, *Odontomyia staurophora*, and *Stratiomys annectens*. The last two species are of special interest because they form connecting links between European and even more closely related Nearctic species.

Additional Records of the Cockroach, Supella supellectilium (Serv.), in California

The recent note by Rehn (Ent. News, 1940, 51:222) recording the presence of *Supella supellectilium* (Serv.) in California (San Bernardino) for the first time prompts the writer to offer this additional note. Recently (Nov. 4, 1940) specimens of this cockroach (one male, one nymph) were collected in Owens Valley by Dr. Harvey W. Crook, Inyo County Health Officer. Dr. Crook stated that the cockroaches were causing trouble in a house, where they were found in the kitchen, around the sink, in cupboards, in cracks, etc.; the oöthecæ were found on curtains, in corners and other convenient places.

Through Dr. B. C. McIvor, another record is available from Alameda, California; the specimens were obtained in the fall of 1937.

For additional information concerning this cockroach, the reader is referred to the papers of Back (Proc. Ent. Soc. Wash., 1937, 39:205) and Gould & Deay (Purdue Univ. Agric. Exp. Sta. Bul. No. 451, 1940).—Thomas H. G. Aitken.

A LIST OF THE ANTS OF WASHINGTON STATE

(Hymenoptera, Formicidæ)

BY FALCONER SMITH

Cambridge, Massachusetts

Seventy-nine species, subspecies, and varieties of ants are included in the following list. Of these, two, *Formica moki* subsp. *xerophila* M. R. Smith and *Leptothorax diversipilosis* M. R. Smith, are new and recently described species. Those thirteen forms indicated by an asterisk are reported for the first time from Washington.

The geographic range of the ants has been indicated by letters in brackets after each specific name. Thus [E] refers to eastern Washington; [W] to western Washington; and [EW] to both regions. Initials have been substituted for most of the collectors' names, and these have been placed after the name of the locality as follows: (TK), Professor Trevor Kincaid; (Wheel), Professor W. M. Wheeler; (Mann), W. M. Mann; (FS), Falconer Smith.

Free use has been made of several important papers on the Washington formicifauna* and reference to these is necessary for information on the biology of the ants.

The writer acknowledges his appreciation to M. R. Smith for his determination and verification of many of the forms; and to Professor Trevor Kincaid for his valuable guidance and kind permission to use his extensive ant collection.

Subfamily Ponerinæ

1. *Stigmatomma pallipes* subsp. *oregonense* Wheeler. [W] Seattle (FS); Bothell, Olympia (TK).

Subfamily Myrmicinæ

2. *Monomorium pharaonis* L. [W] Seattle (TK).
3. *Solenopsis geminata* Fabr. "California to British Columbia" (Barret).
4. *Solenopsis molesta* Say. [EW] Pullman, Wawawai (Mann); Olympia, Tenino [TK]; Tacoma, Dry Falls, Vantage, Soap Lake (FS).

*Mann, W. M. 1911. On some Western Ants and their Guests. Psyche, 8:493-514.

Wheeler, W. M. 1910. North American Ants of the Genus *Camponotus*. Ann. Acad. Sci., N. Y., 20:295-354. — 1913. Ants of the Genus *Formica*. Bull. Mus. Comp. Zool., Harvard, 53:390-565.

5. *Solenopsis molesta* var. *validiuscula* Emery. [E] Wawawai (Mann).
6. *Pheidole californica* subsp. *oregonica* Emery. [E] Almota, Pullman, Wawawai (Mann); Corfu, Vantage, Grand Coulee, White Bluffs, Dry Falls (FS).
7. *Stenamma brevicorne* subsp. [W] Bay Center (TK); San Juan Is. (FS).
8. *Stenamma brevicorne* subsp. *diecki* Emery.* [W] Bay Center (TK).
9. *Stenamma nearcticum* Mayr. [W] San Juan Is. (FS).
10. *Aphænogaster subterranea* subsp. *occidentalis* Emery. [EW] Almota (A. L. Melander); Pullman, Wawawai (Mann); Olympia (TK); Fort Lewis, San Juan Is., Cle Elum (FS).
11. *Aphænogaster subterranea* subsp. *valida* var. *manni* Wheeler. [E] Pullman (Mann).
12. *Aphænogaster subterranea* subsp. *borealis* Wheeler.* [W] Olympia (TK); San Juan Is. (FS).
13. *Pogonomyrmex occidentalis* Cress. [E] Wawawai (Mann); Spokane (TK); Dead Man's Lake (Adams County), Moses Lake, Stratford, Toppenish, Vantage (FS).
14. *Myrmica mutica* Emery. [EW] Ellensburg, Pullman (Mann); Olympia, Nisqually River (TK); Stuck River (FS).
15. *Myrmica rubra* subsp. *brevinodis* Emery.* [W] Chase Lake (King County) (FS); Chinook, Bay Center, Naselle River (TK).
16. *Myrmica rubra* subsp. *brevinodis* var. *sulcinodoides* Emery.* [W] Naselle River, Bay Center (TK); Nisqually River, San Juan Is., Stuck River (FS).
17. *Myrmica rubra* subsp. *brevinodis* var. *subalpina* Wheeler. [W] Orcas Island (Mann).
18. *Myrmica scabrinodis* var. *sabuleti* Meinert. [W] San Juan Is. (Mann).
19. *Leptothorax acervorum* subsp. *canadensis* Prov.* [W] Bay Center, Olympia (TK); Seattle, Garland Hot Springs (FS).
20. *Leptothorax acervorum* subsp. *canadensis* var. *yankee* Emery. [W] Seattle, San Juan Is. (FS).
21. *Leptothorax curvispinosus* subsp. *rugatulus* Emery.* [EW] Seattle (TK); Fort Lewis, Leavenworth, Cle Elum, San Juan Is., Dryden (FS).
22. *Leptothorax nitens* subsp. *occidentalis* Wheeler. [W] Friday Harbor (TK), (FS).

23. *Leptothorax melanderi* Wheeler. [E] Pullman (Mann).
24. *Leptothorax eldoradensis* Wheeler.* [EW] Cle Elum (FS); Rosario (TK).
25. *Leptothorax diversipilosis* M. R. Smith.* [W] Fort Lewis (FS).

Subfamily Dolichoderinæ

26. *Tapinoma sessile* Say. [EW] Pullman, Ellensburg, Orcas Island (Mann); Almota (A. L. Melander); Rock Lake (Wheeler); Cle Elum, San Juan Is., Seattle, Olympia, Mt. Angeles, Sequim, Grand Coulee (FS).
27. *Iridomyrmex analis* Andre. [E] Wawawai (Mann).

Subfamily Formicinæ

28. *Brachymyrmex heeri* subsp. *depilis* Emery.* [E] Grand Coulee (FS).
29. *Lasius niger* var. *neoniger* Emery. [EW] Union City (J.C. Bradley); Pullman (Mann); Bay Center, Chinook, Nellicota (TK); San Juan Is., Seaview, Skating Lake (FS).
30. *Lasius niger* var. *americanus* Emery. [EW] Orcas Island (Mann); San Juan Is., Seattle, Soap Lake (FS).
31. *Lasius niger* var. *sitkaensis* Perg. [EW] Pullman (Mann); Olympia, Bay Center (TK); Seattle, Bluitt Pass, Bothell, Fort Lewis, Mt. Rainier, Mt. Pilchuck, Neah Bay, San Juan Is., Seabeck, Stillaquamish River, Puyallup (FS).
32. *Lasius brevicornis* Emery. [E] Pullman (Mann); Cle Elum (FS).
33. *Lasius interjectus* Mayr. [E] Pullman (Mann).
34. *Lasius latipes* Walsh. [E] Pullman, Wawawai (Mann); Almota (A. L. Melander); Rock Lake (Wheeler).
35. *Lasius claviger* Roger.*[E] Grand Coulee (FS).
36. *Formica manni* Wheeler. [E] Kiona, Pullman, Wapato, Wawawai (Mann); Grand Coulee (FS).
37. *Formica sanguinea* subsp. *subintegra* Emery. [EW] Pullman (Mann); Olympia (TK).
38. *Formica sanguinea* subsp. *subnuda* Emery. [W] Seattle (Wheel.); San Juan Is., Mt. Pilchuck, Olympia, Garland Hot Springs (FS).
39. *Formica sanguinea* subsp. *puberula* Emery. [EW] Pullman (Mann); Olympia (TK).

40. *Formica oreas* var. *comptula* Wheeler. [EW] Pullman (Mann); San Juan Is. (FS).
41. *Formica truncicola* subsp. *integra* Nyl.* [EW] Cle Elum, Alder Creek (Chelan County), San Juan Is. (FS).
42. *Formica truncicola* subsp. *integroides* Emery.* [EW] Cle Elum, Yakima, Leavenworth, San Juan Is. (FS).
43. *Formica truncicola* subsp. *integroides* var. *subclaviceps* Wheeler. [W] San Juan Is. (Mann); Seattle (FS).
44. *Formica truncicola* subsp. *integroides* var. *hæmorrhoidalis* Emery. [E] Ellensburg (S. Henshaw).
45. *Formica rufa* subsp. *obscuripes* Forel. [EW] Pullman (Mann); Loon Lake (S. Henshaw); Rock Lake (A. L. Melander); San Juan Is., Grand Coulee (FS).
46. *Formica rufa* subsp. *obscuripes* var. *melanotica* Emery. [EW] Pullman (Mann); Olympia (TK); Tacoma, Fort Lewis, San Juan Is., Shelton, Seattle (FS).
47. *Formica microgyna* subsp. *rasilis* Wheeler. [W] Olympia (TK).
48. *Formica fusca* L. [EW] Pullman (Mann); Mt. Rainier (J. C. Bradley); San Juan Is. (Mann), (FS); Shaw Island, Bothell, Seattle, Paradise, Sequim, Tacoma, Olympic (FS), Labam (TK).
49. *Formica fusca* var. *subsericea* Say. [EW] Olympia (TK); Dry Falls, Tacoma (FS).
50. *Formica fusca* var. *argentea* Wheeler. [EW] Pullman, Wawawai (Mann); Yakima (S. Henshaw); Mt. Rainier, Seattle (Wheel.).
51. *Formica fusca* var. *marcida* Wheeler. [EW] Ellensburg, Kiona (Mann); Brinnon (J. C. Bradley); Soap Lake (FS).
52. *Formica fusca* var. *subænescens* Emery. [EW] San Juan Is. (Mann); Brinnon (J. C. Bradley); John Island, Cle Elum (FS).
53. *Formica fusca* var. *gelida* Wheeler. [EW] Olympic Mts. (J. C. Bradley); Toppenish, Leavenworth, Stratford, San Juan Is., Mt. Rainier, Orcas Is., Chase Lake (King County), Soap Lake (FS).
54. *Formica fusca* var. *neorufibarbis* Emery. [W] San Juan Is. (Mann); Union City, Mt. Rainier (J. C. Bradley); Olympia, Naselle River (TK); Bothell, Snoqualmie Falls, Granite Falls (FS).

55. *Formica fusca* var. *neoclara* Emery. [EW] Wawawai (Mann); Moses Lake, Goose Lake (FS); Olympia, Bay Center, North Bend, Nemah River (TK).
56. *Formica fusca* var. *blanda* Wheeler. [W] Olympia, Seattle (TK); Fort Lewis, Paradise (FS).
57. *Formica fusca* subsp. *pruinosa* Wheeler. [E] Wawawai (Mann).
58. *Formica fusca* var. *lutescens* Wheeler. [E] Ellensburg, Kiona, Wawawai (Mann).
59. *Formica rufibarbis* var. *occidua* Wheeler. [EW] Wawawai (Mann); Seattle (FS).
60. *Formica subpolita* Mayr. [EW] Orcas Is. (Mann); Vantage, Grand Coulee, San Juan Is., Tacoma (FS).
61. *Formica subpolita* var. *camponoticeps* Wheeler. [E] Rock Lake, Wawawai (Mann); Govan (J. A. Hyslop); Almota (A. L. Melander).
62. *Formica subpolita* var. *picea* Emery. [EW] Pullman (Mann); Grand Coulee, Seattle (FS).
63. *Formica cinerea* var. *lepida* Wheeler. [W] Seattle (TK) (FS); Sand River, Bay Center (TK); Garland Hot Springs, Stuck River (FS).
64. *Formica neogagates* Emery. [EW] Almota (A. L. Melander); Pullman, Wawawai (Mann); Soap Lake, San Juan Is. (FS).
65. *Formica neogagates* subsp. *lasioides* var. *vetula* Wheeler. [EW] Pullman (Mann); Olympia, Bay Center, San Juan Is. (TK).
66. *Formica moki* subsp. *xerophila* M. R. Smith.* [E] Leavenworth (FS).
67. *Formica pallide-fulva* subsp. *schaufussi* Mayr. [W] Seattle (TK) (FS).
68. *Polyergus rufescens* subsp. *breviceps* Emery. [E] Pullman (Mann).
69. *Camponotus lævigatus* Fred. Smith. [EW] Union City (J. C. Bradley); Seattle (TK); Bothell (FS).
70. *Camponotus maculatus* subsp. *vicinus* Mayr. [EW] Almota (A. L. Melander); Pullman, Grand Coulee (Mann); San Juan Is., Orcas Is., Shelton, Seattle (FS).
71. *Camponotus maculatus* subsp. *vicinus* var. *nitidiventris* Emery.* [EW] Nisqually River (TK); Cle Elum, Tacoma, San Juan Is., Soap Lake, Cashmere (FS).

72. *Camponotus maculatus* subsp. *vicinus* var. *luteangulis* Wheeler. [EW] Yakima River (S. Henshaw); Wawawai (Mann); Cle Elum, San Juan Is., Shelton (FS).
73. *Camponotus maculatus* subsp. *vicinus* var. *plorabilis* Wheeler. [EW] Almota (A. L. Melander); Ellensburg, Kiona, Pullman, San Juan Is. (Mann); Seattle (Wheel.).
74. *Camponotus maculatus* subsp. *maccooki* Forel. Washington (Osten Sacken).
75. *Camponotus herculeanus* subsp. *pennsylvanicus* De Geer. [W] San Juan Is (Mann).
76. *Camponotus herculeanus* subsp. *pennsylvanicus* var. *whymperi* Forel. [EW] Wenass, Spokane, Brinnon (Wheel.); Neppel (FS); Mt. Rainier (J. C. Bradley).
77. *Camponotus herculeanus* var. *modoc* Wheeler. [EW] Klikitat Valley (S. Henshaw); Pullman (C. V. Piper); Union City (J. C. Bradley); Olympia, Bay Center (TK); San Juan Is. (Mann) (FS); Park Forest Camp (Kittitas County), Maple Creek (Chelan County), Flowing Lake, Steven's Pass, Seattle (FS).
78. *Camponotus herculeanus* subsp. *ligniperdus* var. *novæboracensis* Fitch. [EW] Union City (J. C. Bradley); Nisqually River, Olympia (TK); San Juan Is., Seattle, Cle Elum (FS).
79. *Camponotus caryæ* (Fitch). [W] Washington (Wheel.); Olympia (TK).

THE MOSQUITO GENUS MANSONIA BLANCHARD IN CALIFORNIA

While studying material in the mosquito collection of the University of California the writer encountered four female specimens of *Mansonia perturbans* (Walker), a mosquito new to California. This is the first record of the genus *Mansonia* from California and greatly extends the known distribution of the species. Previously the species has been collected as far west as British Columbia, Montana, and the Mississippi Valley. The California specimens are from widely separated localities and were collected by Professor W. B. Herms, University of California, during the course of malaria mosquito surveys. The records are: Landers, Placer County, July 9, 1917; Galt, San Joaquin County, July 15, 1917; Holt, San Joaquin County, July 17, 1919; and Bakersfield, Kern County, July 28, 1919. The writer is indebted to Dr. Thomas H. G. Aitken for verification of his determination.—WILLIAM C. REEVES.

A NEW SPECIES OF XYLOTRECHUS

(Coleoptera, Cerambycidæ)

BY RALPH HOPPING

Vernon, British Columbia

Xylotrechus robustus Hopping, new species

Holotype, male, length 17 mm., width 5 mm. Color dark brown to black with grey hairs on the fasciae. Front of head with coarse grey hairs on each side and below frontal umbone. Base of each antenna with a small pubescent spot situated in eye emargination. Pronotum with a narrow anterior marginal band. Scutellum clothed with grey vestiture. Elytra with three transverse bands and tips of elytra grey and truncate. First or subbasal band interrupted each side of elytral suture, the second band interrupted at suture, third band attaining suture. Abdomen with four pubescent bands on posterior margins of segments and a short broken one just in front of hind legs. Bicarination on front of head opaque and roughened and not polished as in most species of *Xylotrechus*. Tarsi of fore legs rather strongly dilated, probably more so than in any other species of the genus.

Allotype, female, length 18 mm., width 6 mm. Differs from the male only in the more slender femora, shorter antennæ, lack of finely granulated areas on occiput and distinctly yellow fasciæ rather than grey as in the male.

The male holotype bears the labels "Ed. B. Andrews, Estes Park, Colo.", "Estes Park, Colo., Griffith Mill, 4-IX-35-7800." The female allotype bears the labels "Ed. B. Andrews, Estes Park, Colo.", "Estes Park, Colo., Griffith Mill, 10-IX-35-7800." Five male and three female paratyes were all taken at Griffith Mill between September 4 and 14, 1935.

Types are in the collection of the author. Paratypes are in the collection of Mr. Ed. B. Andrews (6) and the author (2). I am indebted to Mr. Andrews for the very fine series of ten specimens from which this species was described.

The species belongs to the *undulatus* group as defined in the revision, "The Clytini of Boreal America, Pt. 1," by George R. Hopping (Ann. Ent. Soc. Amer., 25:529-570, 4 plates, 1932). On page 540 of the above, last paragraph under *X. mormonus*, "*insignis*" should read "*undulatus*." *X. robustus* is probably nearer *mormonus* than any other species, but averages much larger and lacks the sparse grey hairs on the elytra and abdomen of *mormonus*. From *undulatus* it differs conspicuously in its

absence of longitudinal markings, all markings being transverse, resembling more the *Neoclytus* in this respect than the typical *Xylotrechus*.

In the series, the males run from 14 to 17 mm., and the females 14 to 18 mm.

Charles William Woodworth

Charles William Woodworth, who recently died on November 19, 1940, was born at Champaign, Illinois, April 28, 1865. He was one of America's first trained entomologists, having studied with S. A. Forbes and graduated from the University of Illinois in 1885 and with H. A. Hagen at Harvard University 1886-8 and 1900-1. He served as entomologist and botanist at Arkansas Agricultural Experiment Station from 1888 to 1891 and in the latter year moved to California where, at the University of California, he became a leader in the development of entomology on the Pacific Coast. He became professor of entomology in 1913 and emeritus in 1930. His interests were many, for he encouraged and promoted systematic, economic, and medical entomology, and was also a mathematician, physicist, chemist, and inventor. He organized the University of California Entomological Society in 1895 and published "The Entomologists' Daily Post Card," the organ of this society, to the extent of 118 issues in 1895. He also founded the Pacific Slope Association of Economic Entomologists in 1909 and was its first president.

He published extensively in the field of entomology and wrote: "A List of the Insects of California," in 1903; "Wing Veins of Insects," in 1906; "Guide to California Insects," in 1913; "Classification of Orders of Insects," in 1915; "Microscope Theory," in 1924; and many other important papers. He was a member and at one time president of the Cambridge Entomological Club, an honorary fellow of the Entomological Society of America, a member of the Pacific Coast Entomological Society (1901) and later (1912) an honorary member, a charter member of the American Association of Economic Entomologists, a fellow of the American Association for the Advancement of Science, and a member of other scientific societies. More extended biographies have been prepared and will appear in early issues of *Science* and the *Journal of Economic Entomology*. —E. O. Essig.

THE LIFE HISTORY OF PHLŒOTHRIPS (HOPLANDROTHRIPS) SYCAMORENSIS (MASON)

(Thysanoptera, Phlœothripidæ)

BY N. STAHLER

University of California, Berkeley

The abundance of *Phlœothrips* (*Hoplandrothrips*) *sycamorensis* (Mason) on the London plane tree, *Platanus acerifolia*, on the University of California campus in Berkeley suggested an investigation of the life history of this species. This study was carried on during the past winter from November to April, inclusive. The thrips were kept in small Stender dishes and fed on fresh green bark. Some difficulty was experienced in maintaining the first instar larvæ alive, but the later stages were rather easily reared.

According to Bailey (1938, Pan-Pac. Ent., 14:19-23) the taxonomy of this species is in doubt, although it plainly belongs in the genus *Phlœothrips* Haliday. Mason (1926, Pan-Pac. Ent., 2:155-7) described the species from sycamore trees at Springville, California, and stated that the larvæ are "light yellow to colorless" and that the winter is passed in the egg stage. The present observations indicate that he may have confused the life history with that of another species, possibly *Karnyothrips flavipes* (Jones), as suggested by Bailey (*in litt.*). The writer takes pleasure in acknowledging the assistance rendered by Dr. S. F. Bailey.

The metamorphosis of this species of thrips follows the pattern outlined for phlœothripid Thysanoptera by Priesner (1927, *Thysanopteren Europas*, Lf. III:484). The eggs are white, faintly reticulate and subellipsoidal (0.27 mm. x 0.17 mm.) with tapering micropylar end. Several days prior to eclosion the embryo may be seen within the egg with the red eye spots near the micropyle. Eggs are found in masses under loose bark, particularly around growth or leaf scars. Females deposit their eggs singly over a period of several weeks, and although the generations overlap, the period of maximum egg abundance during these observations was in early February. Under laboratory conditions the egg stage required about twelve days, but during the cool winter months under natural conditions, it lasted as long as three weeks.

When freshly hatched, the first instar larvæ are about 0.6 mm. in length with the terminal setæ of the abdominal tube

nearly as long as the body. The antennæ, dorsal thickenings of the thorax and tube are grey, while the rest of the body, except for the scarlet-red eyes, is transparent. In about a day a contrasting scarlet coloration appears in the form of a wide pleural band extending from the prothorax to the ninth abdominal segment and in irregular patches on the dorsal area of the thorax. The dorsum of the abdomen and the entire venter of the body are pale yellow. Before molting, the primary larvæ reach a length of about 1.2 mm. Under laboratory conditions, where the length of the stages was determined, the first instar requires about eleven days and is the most active stadium of the thrips.

The first and second instar larvæ may be conveniently separated by the shape of the third antennal segment which is about 1.4 times as long as its greatest width in the former and about 2.3 in the latter. The second larval stadium lasts four to five weeks, depending in part on the abundance of food and the humidity. The larvæ vary in length from 1.4 to 2.0 mm. The antennæ and tube are fuscous, the legs pale fuscous and the head flavotestaceous. Each thoracic tergum bears a broad crimson patch. No other changes from that described for the first instar appear during this active feeding stage.

The prepupal stage of *P. sycamorensis* (averaging 1.5 mm. in length and lasting for two to three days) is readily distinguished by its short horn-like antennæ. The scarlet markings are broader than in the preceding stage, tending to form complete rings around the prothorax and posterior abdominal segments. The antennæ, legs and tube are nearly transparent, while the rest of the body appears as in earlier stages. The prepupæ are sluggish and do not feed.

The first pupa, which is about the same size as the preceding instar, is characterized by the reflexed antennæ about as long as the head and by the wing pads which reach to the anterior margin of the second abdominal segment. The red pigmentation is reduced to discontinuous lateral maculations. The first pupa molts in two or three days. The second pupal stage differs from the first by the longer antennæ which extend to the middle of the prothorax and by the wing pads which reach to the third abdominal segment. It is somewhat larger (about 1.9 mm. long) and the more pronounced scarlet pigmentation is in the form of discontinuous bands on the dorsal and lateral areas of the body. The compound eyes are noticeably larger than in the first pupa. The second pupal period lasts from five to

seven days. The pupæ of both stages secrete themselves in crevices under the bark and do not feed.

In the freshly emerged adult the antennæ, head and legs are nearly transparent and the rest of the body ferrugineous. The development of the black cuticular color takes place during the first day and as readily in darkness as in sunlight. In the laboratory eggs were deposited one week after the adults had emerged. The total life cycle of this species of *Phlœothrips*, from egg to egg, lasts approximately eleven weeks, seven of which are spent in feeding stages.

The larvæ and adults are negatively phototropic and when crawling or feeding on the outside of the trunk gather on the shady side of the tree. They are more active in warmer weather and very few specimens were found moving about until the leaves appeared. Some are to be seen on the larger branches but the writer could discover only a few adults and larvæ on the leaves.

Among the natural enemies may be listed a species of *Cephalothrips*, predaceous upon the eggs and larvæ and an anthocorid bug (identified by Dr. R. L. Usinger as *Xylocoris* sp.) preying on all stages. Several common species of ladybird beetles, *Chilocorus bivulnerus* Muls., *Adalia bipunctata* (Linn.) and *Lindorus lophanthæ* (Blaisdell) were present in thrips colonies and fed on the larvæ in the laboratory. Mites were observed feeding on the yolk within partly ruptured egg shells, but none was seen to actually pierce the eggs.

The Henry Clinton Fall Memorial Publication Fund

The Pacific Coast Entomological Society has recently received, through Mrs. Carl A. Richmond, a gift of securities valued at one thousand dollars from the estate of the late Henry Clinton Fall. This fund is to be known as the Henry Clinton Fall Memorial Publication Fund and is to be administered by the Board of Directors of the Society through its Publication Committee. The terms of the bequest generously provide for considerable freedom of action both in the administration of the fund and in the subject matter covered by the publications to which it is applied.

Dr. Fall was a charter member of the Society and served as its first vice-president. The establishment of this fund is a fitting memorial to his long association with the Society and with entomology in California.—E. G. Linsley.

A NEW SPECIES OF ANTHOPHORA FROM CALIFORNIA

(Hymenoptera, Apoidea)

BY P. H. TIMBERLAKE

University of California Citrus Experiment Station, Riverside, California.

The following species of *Anthophora* is published at this time to provide a name for use in other papers. The type is deposited in the collection of the Citrus Experiment Station, Riverside, California.

Anthophora linsleyi Timberlake, new species

This belongs to a small southwestern group having the hind tibia of the male dilated and produced at apex on inner side, the process bearing the inner tibial spur a short distance before the apex, and having the hind basitarsus much dilated, flattened, and with a sharp tooth on inner margin near base. *A. vallorum* (Ckll.) appears to be the only other described species belonging to this group, and it differs from *linsleyi* in having the face marks yellow; the hind tibia much less expanded at apex, with the process comparatively small, tapering and acute, and the spur inserted just before its apex; the tooth on the hind basitarsus much smaller and placed half way between the base and middle; the pubescence more or less tinged with fulvous; and the fifth tergite of the female with much black hair.

Male. Moderately robust, black. Small spot at base of mandibles, labrum except usual pair of spots, clypeus except extreme anterior margin and a spot on suture on each side above, transverse supraclypeal mark, lateral face marks roundly emarginate above, with a short orbital extension to level of antennæ, and scape beneath, creamy white. Claws rufous on basal half. Spurs rufotestaceous. Tegulæ piceous. Wing almost clear hyaline. Tergites one to six broadly whitish hyaline at apex. Tergite seven with two small teeth at apex, widely separated by a rounded sinus. Front and middle legs quite ordinary. Hind legs as described above, with the following particulars: Hind femora and tibiæ subincrassate. Spinous tip of tibial process a little blunt at apex and bent straight backward parallel with axis of tibiæ, this process also with a small acute tooth on inner margin opposite the insertion of the spur. Hind basitarsus broadest across basal half, then tapering to moderately wide apex, with the outer margin arcuate, more strongly rounded out on basal half. Inner margin straight except for the rather large triangular tooth placed ditinctly basad of the middle. Inner margin also produced in a very small sharp tooth at apex. Mandibles short, tapering, acute at apex and almost

edentate on inner margin. Third antennal joint equal to the fourth plus one-half the fifth joint. Clypeus dullish, very obscurely punctured. Frons, vertex and thorax moderately shining, with very fine shallow punctures, most distinct on the mesonotum. Vertex between lateral ocellus and eye very minutely sculptured, but shining, impunctate. Abdomen a little dullish, finely granular-punctate. Pubescence long and rather dense, dull ochreous or grayish, and sparsely intermixed with black on mesonotum. Hair of face below antennæ sparse. On frons a transverse line of black hairs just below anterior ocellus, and another group on each side at a slightly higher level. Vertex with much black hair on each side close to occipital margin, but hair in middle light. First tergite with long dense light hair. Following segments with shorter, thinner, erect hair, which is more or less black at base of tergites three and four, and sometimes tergites two to six. Venter with fine, short, appressed, light hair, except that on the first segment which is much longer and erect. Near the middle of the venter is a large circular patch of black pubescence situated mostly on segments four and five. Hair of legs light, but becoming chocolate brown on inner side of tarsi. Length, 10-12 mm.; anterior wing, 7.6-8.7 mm.; width of abdomen, 3.8-4.5 mm.

Female. Similar to male. Face entirely black. Clypeus convex, more or less shining, closely and shallowly punctured, sometimes with a more or less distinct median impunctate line. Mandibles often yellow-testaceous apically, the inner tooth very small and placed considerably before the apex. Joint three of antenna about equaling joints four to six combined. Apices of tergites less broadly and less conspicuously whitish hyaline. Wings considerably more dusky. Tibial spurs dark brown or blackish. Pubescence generally more ochreous, rarely pale fulvous, with black hairs inconspicuously intermixed on mesonotum. Black hairs on frons and vertex as in male. First tergite with long, light, erect hair. Following segments appearing comparatively nude, clothed with shorter, subappressed, mostly light hair, but with some black pubescence at base of tergites two to four. Hair of tergite five light, but hair on each side of the pygidial plate of tergite six chocolate brown. Hair of legs light, but more or less fuscous or black on coxæ and trochanters, and hair on inner side of tarsi chocolate brown, that on hind basitarsi margined on each side with blackish. Apical tuft of hind basitarsus dark brown or fuscous. Scopal hairs of hind tibia and basitarsus glistening ochreous white. Length, 10-13 mm.; anterior wing, 8.5-8.8 mm.; width of abdomen, 4.5-4.8 mm.

Holotype, male, allotype, female, and eight paratypes, males, collected at nests in roadway, near mouth of Deep Creek, Mohave Desert, April 26, 1936 (E. G. Linsley). Also the following paratypes: thirty-five females collected under the same circumstances

as the type, May 5, 1936 (Linsley and Timberlake); four females, Westwood Hills, Los Angeles County, June 3 and 26, 1935 (Linsley); two females, Panoche Creek, Fresno County, April 30, 1922 (A. J. Basinger); three males reared from larvæ collected eight miles south of Little Lake, Inyo County, April, 1940 (G. E. Bohart); one female, west side of Mohave River, one mile from mouth of Deep Creek, on *Salvia carduacea*, May 5, 1936; one female, four miles east of Adelanto, on *Lupinus odoratus*, May 22, 1932; two females, three miles southwest of Victorville, on *Dalea saundersii*, May 6 and 12, 1939; two males, ten females, Lovejoy Buttes, seven miles north of Llano, on *Salvia carduacea*, May 2, 1937; one male, same locality and day, on *Phacelia distans;* two males, eighteen females, four miles west of Coalinga, Fresno County, on *Salvia carduacea*, May 11, 1938; and eight females, same locality and day, on *Lupinus* (Timberlake).

Book Notices

The Spider Book. By John Henry Comstock, revised and edited by W. J. Gertsch. Doubleday, Doran and Company, Inc. pp. xi+729, 770 text figures. 1940. Price $6.00.

Perhaps the greatest tribute to this well-known book is the present "revision" by a leading authority on spiders who found it necessary to add but little and revise almost nothing. To quote from the editor's introduction, "Inasmuch as the Spider Book was intended as a popular introduction, it has seemed inexpedient to incorporate into the book controversial arrangement, debatable nomenclature, or radical departure from the present standard." We might expect that the more significant of the recent advances in arachnology would be useful, even in an introductory book, but entomologists should be grateful to learn that this standard work is once more available.

An Introduction to Entomology. By John Henry Comstock. Ninth edition, revised. Comstock Publishing Company, Ithaca, New York. pp. xxi+1064, 1228 figures, portrait of J. H. Comstock. 1940. Price $5.00.

The constant demand for this standard text book of entomology has necessitated frequent reprintings. The present edition provides a fuller treatment of the parasitic Hymenoptera by Dr. H. K. Townes. It is to be regretted, however, that the bibliography contains no reference to the standard entomological works of the past decade. To treat insect morphology without reference to the works of Imms, Weber, and Snodgrass, physiology without reference to Wigglesworth and the various orders of insects without mention of the leading works in these fields is to misguide a generation of beginning students.—R. L. Usinger.

A NEW SPECIES OF ELEODES FROM NORTH-EASTERN ARIZONA

(Coleoptera, Tenebrionidæ)

BY FRANK E. BLAISDELL, SR.

Stanford Medical School and Associate in Research, California Academy of Sciences, San Francisco, California

In 1933 the Ansel Hall Expedition into north-eastern Arizona and south-eastern Utah, collected the interesting species of *Eleodes* which is described below.

Eleodes (Melaneleodes) halli Blaisdell, new species

Form ovate, widest across middle of elytra, in the female slightly more than twice as long as wide. Color black and dull in luster, under surface of body somewhat shining and polished. Punctation quite strong and moderately dense; elytra densely punctato-muricate, punctures with short blackish or brownish inconspicuous hairs.

Head moderate in size, not quite as wide as pronotal apex, widest across eyes and there twice as wide as long before post-ocular line; sides not prominent, margins moderately arcuate over antennal insertions, thence straight and convergent, continuously so with sides of epistoma, the latter broadly and feebly emarginate at apex, angles rounded. Frons nearly plane, slightly convex laterally and feebly declivous against eyes, sutures obliterated; densely punctate, punctures moderately small, slightly coarser apically on epistoma; labrum slightly convex, side arcuate, angles well rounded, apex not widely emarginate at middle. Eyes transverse, short, upper lobe slightly larger; broadly and feebly emarginate anteriorly. Antennæ long, extending about three segments beyond pronotal base, last three segments slightly wider than the preceding, second segment short and annular as usual, one-fourth as long as third; the latter elongate and subcylindrical, four times as long as wide at apex; segments four to seven inclusive subequal in length and width, feebly obconical and about two and one-half times as long as wide; eighth obconical and a little longer than wide; ninth and tenth irregularly subspherical, about as long as wide; eleventh slightly narrowed apically and not quite twice as long as wide.

Pronotum subquadrate, about one-sixth wider than long; apex truncate, very finely beaded, bead interrupted at middle, angles obtuse-angular and slightly blunt; sides moderately arcuate, widest just before middle, thence straighter and convergent to base, very slightly sinuate; base in width equal to pronotal length and about one-sixth wider than apex, moderately and broadly arcuate, marginal bead rather fine, angles obtuse and scarcely rounded. Disk feebly convex centrally, gently and arcuately declivous in about lateral sixth, marginal beads not visible from above, quite obsolete on basal sinuation; densely punctate, punctures slightly larger than on head, denser laterally and well separated centrally.

Pronotal sides and sternum densely punctato-rugose.

Elytra oval, obtusely pointed apically, about one-half longer than wide and two and one-half times as long as pronotum; base scarcely wider than pronotal base, feebly emarginate and adapted to that of pronotum, humeri obtuse-angulate, their surfaces slightly concave to receive the pronotal basal angles, scutellum transverse, small and arcuate at apex. Sides broadly, evenly arcuate, most convergent in apical fourth, apex narrowly rounded. Disk rather strongly convex, arcuately declivous laterally and somewhat abruptly inflexed; apical declivity arcuately oblique, almost vertical; surface very densely muricato-punctate somewhat as in *Eleodes tricostata* Say, but with murices smaller and similar throughout and more or less confluent, each bearing a short, blackish setiform hair from its puncture, striæ of punctures more or less distinct and feebly impressed, intervals narrow and very feebly convex, becoming most so laterally and on apical declivity.

Sterna and parapleuræ more or less rugoso-punctate.

Abdomen moderately convex, glabrous and shining, sparsely punctate, punctures small, surface more or less irregularly rugulose. First segment on median line equal to combined lengths of fourth and fifth; second segment equal to third and fourth together, fifth as long as fourth and a little shorter than second. *Legs* moderate in length and stoutness. Metatibiæ about as long as their femora; metatarsi two-thirds as long as their tibiæ, moderately slender, first segment of each equal to combined lengths of second and third, also equal to length of fourth; second and third segments equal to each other, each quite twice as long as wide at apex.

Male. Narrower. Antennæ relatively long. *Abdomen* impressed on middle third of first three segments.

Female. Wider, elytra more oval and more or less slightly inflated. Antennæ shorter and the abdomen more evenly convex.

Measurements of types. Male: length: 14 mm.; width, 5.5 mm. Female: length, 13.5 mm.; width, 6.5 mm.

Holotype, female, No. 5172, and allotype, male, No. 5173, in the collection of the Museum of the California Academy of Sciences. The female was collected at Kayenta, Navajo County, Arizona, 20 miles WNW, on June 27, 1933, at an altitude of 8200 feet, by H. N. Hultgren. The males were secured at Kayenta, 15 miles WNW on June 24, at an elevation of 7200 feet. Three specimens studied: two males and one female; one male a paratype.

Halli is a member of the Quadricollis Section of the subgenus *Melaneleodes*, to which it belongs by reason of the enlarged inner protibial spurs; it is particularly related to the species of the Humeralis Group, by its dull luster and more or less asperate elytral sculpturing; the sculpturing is somewhat similar to that of *tricostata* Say. The elytral setiform hairs arise from the punctures near the tips of the prickles or murices.

In *humeralis* Lec. the elytra are less convex on the disk and the sculpturing is very densely and rather finely, muricately punctate or almost granulate. In *halli* the asperities are distinct murices and not granules.

In *concinna* Blais. the elytra are less asperate and the sculpturing consists of less densely placed muricate granules that are shining at their summits. This species is the form *granulatomuricata* of the author's Monograph.*

In *coloradensis* Blais. (see *humeralis* Lec. forma *tuberculomuricata*, Monograph,*) the form is robust with the elytra subtuberculately muricate mainly laterally and apically.

Halli is most closely related to *fuscipilosa* Blais. from Utah. It differs, however, in its more convex and fusiform-ovate form, striate elytra with the intervals more or less convex, especially on the sides and apical declivity. In both species the sculpturing is similar, the setiform hairs arising from the muricate punctures are longer, coarser and fulvous in color in *fuscipilosa* and the elytra are less convex dorsally, more broadly oval and rather more abruptly inflexed laterally, the strial punctures not impressed as in *halli*.

*Blaisdell, F. E. A monographic revision of the Coleoptera belonging to the Tenebrionide Tribe Eleodiini inhabiting the United States, Lower California, and adjacent islands. U. S. National Museum Bull. 63, pp. xii+524, 13 plates, 1909.

PACIFIC COAST ENTOMOLOGICAL SOCIETY

H. M. ARMITAGE	E. O. ESSIG	E. G. LINSLEY
Vice-President	*President*	*Secretary*

PROCEEDINGS

One Hundred and Sixtieth Meeting, March 16, 1940

The one hundred and sixtieth meeting was held at 2 p. m. in the entomological laboratories of the California Academy of Sciences, San Francisco. President E. G. Linsley in the chair. The following members were present: E. G. Linsley, G. F. Ferris, R. L. Usinger, E. S. Ross, C. D. Michener, J. O. Martin, E. R. Leach, K. S. Hagen, W. E. Simonds, O. B. Cope, L. B. Boyer, R. C. Miller, E. O. Essig, W. H. Lange, H. M. Armitage, P. C. Ting, R. G. Dahl, P. A. Harvey, H. H. Keifer, A. E. Michelbacher. Visitors present were: E. J. Campan, W. F. Barr, Mrs. E. P. Van Duzee, R. Smith, M. Huebler.

The minutes of the previous meeting were read and approved.

Dr. Linsley called for a report of the membership committee. Mr. L. D. Christenson's name was suggested and he was unanimously elected to membership. Mr. E. R. Leach was called upon for the treasurer's report. He called attention to the fact that there were 229 paid subscribers to volume fifteen of the Pan-Pacific Entomologist and 270 paid subscribers all together.

Dr. Michelbacher and Dr. Duncan were appointed to a committee to decide on the time and place for the annual field trip.

Dr. Linsley reported the recommendation of the reorganization committee that the society become incorporated. It was then moved, seconded and carried that the society become incorporated as a non-profit organization. Professor Ferris read the revised by-laws for approval and they were adopted in principle.

Professor Essig suggested that the membership fee for students be reduced to one dollar and that they be given a voice and vote in the society. This suggestion was moved, seconded, and passed.

Dr. Miller reviewed the affiliations of various North American Academies of Science.

Continuing the symposium on "Special Methods of Mounting for Temporary and Permanent Preservation of Insects," Dr. Linsley called on Mr. Ting whose subject was "The Dissection and Preserving of Coleopterous Genitalia." Mr. Ting stated that genitalic characters are now commonly used by coleopterists, but that good judgment should be used in determining their importance just as with the more obvious external characters. He mentioned a recent paper by Dr. P. J. Darlington in which the latter states that a long or short median lobe may exist in individuals of the same species of Carabidæ. Mr. Ting stated that the best genitalia mounts and dissections are made when the genitalia with all

associated parts and the terminal and often invaginated abdominal segments are cleared in caustic potash. A display of different types of genitalia mounts was passed around including dissections kept in minute vials of glycerin held on the pin impaling the exact specimen from which they were dissected, permanent slide counts correlated by number with the pinned specimens, and small celluloid slides attached to the pinned specimens.—PETER C. TING, Secretary.

One Hundred and Sixty-first Meeting, April 28, 1940

Annual field meeting held at Phoenix Lake, Marin County, California. Members present were: R. G. Dahl, J. W. Tilden, N. Stahler, B. Brookman, N. E. Good, T. Aitken, W. C. Reeves, P. D. Gerhardt, J. H. Freitag, E. Lindsay, R. L. Usinger, E. S. Ross, A. E. Michelbacher, C. D. Michener, W. E. Simonds, E. O. Essig, C. D. Duncan, P. C. Ting. Visitors present were: E. G. Meyers, S. Kennedy, E. W. Drews, G. F. Smith, Mrs. Newell Good, Martha Putnam Usinger, Martha Michelbacher, Elinor Freitag, Ethel L. Essig, Mary Isabel Essig, Christine Putnam, T. H. Tudor, Louise Brandt Tudor, Helen Brandt Simonds.

The group assembled at 10 p. m. and collected in the vicinity of Phoenix Lake. After a picnic luncheon most of the members hiked to nearby hills and collected at higher altitudes. Due to adverse weather conditions general collecting was not very good.—PETER C. TING, Secretary.

One Hundred and Sixty-second Meeting, September 21, 1940

The one hundred and sixty-second meeting was held at 2 p. m. in the entomological laboratories of the California Academy of Sciences, San Francisco. President E. G. Linsley in the chair. The following members were present: E. G. Linsley, E. S. Ross, E. C. Van Dyke, N. E. Good, E. O. Essig, G. F. Ferris, J. O. Martin, B. Brookman, O. B. Cope, A. Smith, J. W. Tilden, C. D. Duncan, R. L. Usinger, C. D. Michener, W. F. Barr, K. Hagen, P. A. Harvey, Alice Eastwood, W. E. Simonds. Visitors present were: W. A. Evans, M. B. Irvine, M. M. Barnes, A. W. Brereton, L. H. King, H. I. Magy, G. S. Monsfield, D. R. Murphy, H. T. Reynolds, D. J. Raski, E. Mittler, G. Adachi, M. F. Hastings, W. Y. Chong, A. Bartel, P. S. Crane, E. Lindsay.

The minutes of previous meetings were approved as corrected.

Old business. President Linsley announced that the society had become incorporated and called for financial contributions from those members wishing to assist in defraying the cost involved. He then read the names of the Board of Directors for 1940 as well as the Standing Committees as follows: Board of Directors: E. G. Linsley, President; H. M. Armitage, Vice-President; P. C. Ting, Secretary; E. R. Leach, Treasurer; E. O. Essig (Publication); R. L. Usinger (Editorial); E. S. Ross (Historical); C. D. Duncan (Membership). Standing Committees:

Membership: C. D. Duncan (chairman), A. E. Michelbacher, C. D. Michener; *Program:* G. F. Ferris (chairman), R. L. Usinger, E. S. Ross. *Publication:* E. O. Essig (chairman), E. G. Linsley, C. D. Duncan, H. H. Keifer, G. F. Ferris, F. E. Blaisdell; *Editorial:* R. L. Usinger (editor), E. C. Van Dyke (associate editor), E. S. Ross (assistant editor), G. F. Ferris, E. G. Linsley; *Historical:* E. S. Ross (chairman), E. O. Essig, E. C. Van Dyke, R. L. Usinger, E. G. Linsley.

President Linsley announced receipt of securites valued at $1,000 from the H. C. Fall estate to be identified as the Fall Memorial Publication Fund. This gift was gratefully acknowledged by the secretary in a letter to Mrs. C. A. Richmond dated September 17, 1940.

The membership committee proposed the names of M. M. Barnes, W. F. Barr and F. W. Furry. They were unanimously elected to membership.

The secretary reported for the Board of Directors the recommendation that the society's meetings be increased to eight per year to be held from September through April as a means of adding interest and increasing the continuity of the meetings. It was moved and seconded and carried that this recommendation be adopted.

Dr. Usinger reported that the publication committee had decided to increase the subscription price of the Pan-Pacific Entomologist to $2.50 per year for non-members and explained that this move was prompted by the need for more funds to pay off the deficit coupled with decreased income from the foreign subscribers.

New business. President Linsley appointed a nominating committee consisting of A. E. Michelbacher (chairman), C. D. Duncan and R. L. Usinger to report its recommendations for new officers at the next meeting.

The death of Mr. E. P. Van Duzee was announced by President Linsley and it was decided that the entire October issue of the Pan-Pacific Entomologist be dedicated as a memoriam to him. Professor Essig read an account of the life and works of Mr. Van Duzee written for the issue by himself and Dr. Usinger. Apropos of facts mentioned in this account, Miss Alice Eastwood explained in detail how she saved the entomological types of the California Academy of Sciences from destruction in the earthquake and fire of 1906. The secretary was instructed to write a letter to Mrs. Van Duzee expressing the society's sympathy and feeling of loss with the death of Mr. Van Duzee.

Exhibits and observations. Dr. Ferris briefly discussed his most recent research on the Diaspidæ and exhibited some of his drawings of these scale insects. He also called attention to a display of Mr. Cope's drawings on the morphology of the Psocoptera which will appear in Microentomology.

Dr. Duncan passed around three attractive canes made from branches that had been engraved by scolytid beetles, stating that such branches were found on the ground in shaded situations.

Mr. W. Y. Chong of Davis exhibited a peculiar apterous tipulid (*Chionea*) collected on a snow bank in the Sierra Nevada Mountains.

Mr. G. E. Bohart placed on exhibit a conopid fly with its host bee, pointing out that the fly was remarkably large for so small a host.

Mr. Tilden passed around a collection of moths and beetles which he collected during a recent trip into Arizona.

As the main feature of the program Dr. Van Dyke gave an account of his field work since his last attendance. Leaving Berkeley on August 15, 1939, and traveling by automobile accompanied by Mrs. Van Dyke, he drove by way of the Grand Canyon to Carlsbad Caverns. Here he made a special point to collect in the bat caves as only blind camel crickets could be found in other parts of the caverns. On the bat manure he was able to collect carabid beetles of the genus *Rhadine* which were almost colorless and had reduced eyes. They were collected as they walked about on the surface of the manure and were not found elsewhere in the caves. Also found on the bat manure were numerous bat fleas, two species of moths, and tenebrionid beetles of the genus *Embaphion*. Dr. and Mrs. Van Dyke then drove across the "Pan handle" of Texas and through Oklahoma to Ft. Smith, Arkansas, whence they went into the Quachita Mountains of Arkansas, a southern extension of the Ozark uplift, and on into the Ozarks of Missouri collecting with the hope of securing relict carabid beetles (*Nemoratus*, etc) in this, one of the most ancient ranges in the United States. As the season was unusually dry, collecting was not so good as might otherwise be expected. Leaving this region they drove to Mobile, Alabama, where they remained two months and visited H. P. Loding. The Mobile region was found to be quite diverse with swampy lowlands and pine-covered highlands. The sand dunes of Mobile Bay and of the Gulf of Mexico were found to have a very poor fauna as compared to that of the Pacific Coast dunes. Dr. Van Dyke reported that his most interesting collecting was had in the turpentine cups attached to pine trees in which many beetles become trapped. Beetles thus collected seem to be immune from future attack by museum pests. From Mobile they drove into Florida and collected in the cedar swamps and everglades. Insects were not abundant, probably due to the unusually cold winter. Driving north to Clemson, South Carolina, they visited Mr. O. L. Cartwright and Wm. Upholt. After visiting Henry Good at Auburn, Alabama, in the latter part of April they drove to Cheaha State Park. About the first of May they visited de Soto State Park where, on May 7, Mrs. Van Dyke suffered a paralytic stroke and was taken to Gadsden, Alabama, and placed in a hospital where

she died on the evening of May 18, 1940. Following this very unfortunate happening Dr. Van Dyke returned to Berkeley as soon as possible.—E. S. Ross, Secretary, pro tem.

One Hundred and Sixty-third Meeting, December 7, 1940

The one hundred and sixty-third meeting was held at 2 p. m. in the entomological laboratories of the California Academy of Sciences, San Francisco. President Linsley in the chair. The following members were present: E. G. Linsley, E. S. Ross, R. L, Usinger, E. C. Van Dyke, J. W. Johnson, N. Stahler, N. E. Good, B. Brookman, T. H. G. Aitken, A. E. Michelbacher, G. F. Ferris, W. E. Simonds, W. F. Barr, R. G. Dahl, K. S. Hagen, O. B. Cope, A. C. Smith, E. A. Smith, C. D. Michener, R. J. Bartges, F. E. Blaisdell, Sr., W. H. Lange, H. H. Keifer, C. D. Duncan, H. M. Armitage, E. O. Essig, R. C. Miller. Visitors present were: T. Aarons, D. Murphy, E. Lindsay, F. Driver, C. Peek, A. W. Brereton.

The minutes of the previous meeting were read and approved.

Committee reports. The treasurer's report was given by E. S. Ross due to Mr. Leach's absence. The report was approved.

Dr. Usinger reported for the publication committee and announced that a list of the members of the society will be published in the next issue of the Pan-Pacific Entomologist.

Mr. Ross reported on the work of the historical committee.

Reporting for the program committee, Dr. Usinger reviewed the new meeting schedule and set tentative dates for the spring meetings, as follows: January 25th, February 15th, March 8th and April 13th. The plan for the program in each of these meetings was also announced with Mr. Cope and Mr. Michener to speak during the January meeting concerning their work on the morphology of Psocoptera and bees respectively, Mr. Ross to discuss his research on the Embioptera during the February meeting, the March meeting to be devoted to a symposium on insect ectoparasites lead by Dr. Ferris and the April meeting consisting of the usual field trip. Dr. Usinger urged members wishing to take part in a program to notify the program committee.

The membership committee, with Dr. Duncan reporting, submitted the names of Dr. G. F. MacLeod, Marvin Kolber, Thomas F. Kelley, N. W. Frazier, J. W. MacSwain and A. W. Brereton for membership in the society. All were elected by unanimous vote.

Dr. Michelbacher, reporting for the nominating committee, proposed the names of E. O. Essig for president, H. M. Armitage for vice-president, and Dr. E. G. Linsley for secretary. It was moved and seconded and carried that this report be accepted and that the secretary be instructed to cast a unanimous ballot in favor of these nominees.

Dr. Linsley then expressed sincerest thanks in behalf of the officers and himself for the loyal support given by the members to the society's activities during his term of office. The meeting

was then turned over to the new president, Prof. E. O, Essig, who continued the meeting with a call for exhibits and observations from the members.

Mr. Ross passed around a photograph of a *Polistes* collected by Dr. Van Dyke at Antioch, California, which was remarkable in that it had fifteen female Strepsiptera projecting from the abdomen.

Mr. Armitage described a case of rapid infestation of an orchard by eriophyid mites from a neighboring orchard. A discussion of the mechanism of such dispersal of mites followed. It was generally agreed by Mr. Keifer and others that wind dispersal probably was most important and that birds probably also carried mites from place to place on their legs as is the case with the crawlers of scale insects.

President Essig then called upon Dr. Linsley to present his retiring presidential address entitled "The Biology of the Meloidæ with Special Emphasis on the Genus *Hornia*."

Dr. Linsley first called attention to the paucity of biological studies of North American Meloidæ stating that of the thirty-one North American genera, twenty-nine are practically unknown biologically. In his discussion of hyper-metamorphosis he first mentioned the common practice of referring to the first instar larvæ of meloids as triungulins and suggested the adoption of primary larvæ as a substitute term. He devoted considerable attention to the methods by which the primary larvæ become attached to a host. In reviewing the host relations of the various genera of Meloidæ it was discovered that the Meloinæ are dominantly locust parasites while nearly all the Nemognathinæ are associated with bees. His studies of the possible origin of parasitism of meloids indicate that such habits are developed from predatism and that the change to pollen feeding really was not a great step.

His detailed discussion of the biology of *Hornia* was largely based on a study of two western species; one a subspecies of *minutipennis*, the other a new species from the east side of the Sierra Nevada Mountains. Both of these species are parasitic on bees of the genus *Anthophora*, as are other species of *Hornia*. One of the most peculiar features of the biology of *Hornia* is the fact that mating and oviposition take place in the bee cell occupied by the female, neither sex normally coming to the surface of the ground. The primary larvæ crawl out of a hole in the cell made by the female and wait on the surface of the ground at the nesting site for a host. This larva, upon reaching a cell of the host, first feeds on the host's egg thus reserving for itself the pollen supply intended for the bee larva. It was found that hibernation takes place in the exuviæ of the fourth and fifth instar larvæ, a device which protects the *Hornia* larvæ from the mold which accounts for the death of many bee larvæ.

Following Dr. Linsley's address the meeting was adjourned.—E. S. Ross, Secretary, pro tem.

List of Members*

'37 Aitken, Thomas, 112 Agric. Hall, Univ. of Calif., Berkeley.
'38 Armitage, H. M., State Agric. Bldg., Embarcadero St., San Francisco, Calif.
'36 Atkins, Mr. and Mrs. C. H., 321 So. 8th St., San Jose, Calif.
'35 Bailey, Stanley F., Univ. Farm, Davis, Calif.
'40 Barnes, Martin M., 552 Padilla St., San Gabriel, Calif.
'40 Barr, W. F., 1606 53rd Ave., Oakland, Calif.
'39 Bartges, Rex, 966 Florence Lane, Menlo Park, Calif.
'37 Bartlett, B. R., Univ. of Calif. Citrus Exp. Station, Riverside.
'20 Basinger, A. J., Univ. of Calif. Citrus Exp. Station, Riverside.
'29 Blackwelder, R. E., U. S. Nat. Mus., Washington, D. C.
Ch. Blaisdell, F. E., Ent. Dept., Calif. Acad. of Sci., San Francisco, Calif. (HM '38).
'35 Bohart, George, 1945 Yosemite Road, Berkeley, Calif.
'35 Bohart, Richard M., Dept. of Ent., Univ. of Calif. at Los Angeles, 405 Hilgard Ave., Los Angeles, Calif.
'36 Boyer, L. B., 1490 22nd Ave., San Francisco, Calif.
'07 Bradley, J. C., Ent. Dept., Cornell Univ., Ithaca, N. Y.
'40 Brereton, A. W., 112 Agric. Hall, Univ. of Calif., Berkeley.
'39 Brookman, Bernard, 112 Agric. Hall, Univ. of Calif., Berkeley.
'23 Cain, Brighton C., P. O. Box 796, Oakland, Calif.
'21 Campbell, R. E., P. O. Box 297, Alhambra, Calif.
'35 Cazier, Mont A., 779 Peralta, Berkeley, Calif.
'20 Chamberlin, J. C., Box 278, Forest Grove, Ore.
'40 Christenson, L. D., 1583 D St., San Bernardino, Calif.
'19 Cole, Frank E., 925 W. Highland Ave., Redlands, Calif.
'23 Comstock, John A., Los Angeles Mus., Exposition Park, Los Angeles, Calif.
'39 Cope, Oliver B., Nat. Hist. Mus., Stanford Univ., Calif.
Ch. Cottle, James E., 513 B St., Hayward, Calif.
'39 Dahl, Richard G., 5061 Congress Ave., Oakland, Calif.
'24 Davis, A. C., Bur. of Ent., Beltsville Res. Center, Beltsville, Md.
'36 De Bach, Paul, Citrus Exp. Station, Riverside, Calif.
'35 De Leon, Donald, 210 Forestry Bldg., Ft. Collins, Colorado.
'36 Dickson, R. C., 4474 Elmwood Court, Riverside, Calif.
'19 Dietrich, Henry, Comstock Hall, Ithaca, N. Y.
'37 Downes, Anthony, 120 Pepys Road, Wimbledon, London S. W. 20, England.
'37 Du Bois, J. J., 205 Wayside Drive, Turlock, Calif.
'20 Duncan, Carl D., Box 4, Stanford Univ., Calif.
'02 Eastwood, Alice, Botany Dept., Calif. Acad. Sci., San Francisco, Calif. (HonM '12).
Ch. Ehrhorn, Edw. M., c/o Bishop Museum, Honolulu, T. H.
'36 Embury, M. A., Univ. Farm, Davis, Calif.

*Ch—Charter member (1901).
LM—Life member.
HM—Honored member.
HonM—Honorary member.

'14 Essig, E. O., 201 Agric. Hall, Univ. of Calif., Berkeley, Calif.
'36 Ferguson, George, Ohio State Univ., Columbus, Ohio.
'19 Ferris, G. F., Nat. Hist. Mus., Stanford Univ., Calif.
'40 Frazier, Norman, 112 Agric. Hall, Univ. of Calif., Berkeley.
'25 Freeborn, S. B., Giannini Hall, Univ. of Calif., Berkeley, Calif.
'32 Furniss, R. L., 445 U. S. Court House, Portland, Ore.
'40 Furry, F. W., 947 Nordica Drive, Los Angeles, Calif.
'38 Good, N. E., U. S. Public Health Service, 14th Ave. and Lake St., San Francisco, Calif.
'32 Gressitt, J. Linsley, Lingnan Univ., Canton, China.
'03 Grinnell, Fordyce, 179 Upper Crescent, Sausalito, Calif.
'24 Hadden, F. C., Midway Island, Pacific Ocean (LM '30).
'39 Hagen, Kenneth S., 1313 54th Ave., Oakland, Calif.
'35 Harvey, Paul, S. F. State Teachers College, 124 Buchanan St., San Francisco, Calif.
'27 Heid, Graham, 1927 Talmadge St., Los Angeles, Calif.
'10 Herms, W. B., 2032 Del Norte St., Berkeley, Calif.
'01 Hopping, Ralph, Box 308, Vernon, B. C.
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'27 Keen, F. P., 445 U. S. Court House, Portland, Ore.
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'40 Kelly, T. F., 112 Agric. Hall, Univ. of Calif., Berkeley, Calif.
'36 Kessel, Dr. and Mrs. E. L., 2326 Russell St., Berkeley, Calif.
'20 Kincaid, Trevor, Zool. Dept., Univ. Wash., Seattle, Wash.
'40 Kolber, M., 112 Agric. Hall, Univ. of Calif., Berkeley, Calif.
'32 Lange, W. Harry, Jr., 2205 Derby St., Berkeley, Calif.
'16 Leach, E. R., 217 Hillside Ave., Piedmont, Calif.
'36 Lester, Will, Box 225, Saratoga Ave., Santa Clara, Calif.
'34 Lindahl, J. C., Nat'l Park Service, Belmont, Montana.
'27 Linsley, E. Gorton, 112 Agric. Hall, Univ. of Calif., Berkeley.
'40 MacSwain, J. W., 112 Agric. Hall, Univ. of Calif., Berkeley.
'37 Maehler, K. L., No. 18 Morrill Apts., 2437 Shattuck Ave., Berkeley, Calif.
'35 Mallis, Arnold, Ent. Dept., Univ. of Calif. at Los Angeles, 405 Hilgard Ave., Los Angeles, Calif.
'10 Mann, Wm. M., National Zoological Pk., Washington, D. C.
'19 Martin, J. O., 2617 Derby St., Berkeley, Calif.
'29 McClay, A. T., 1062 47th St., Sacramento, Calif.
'20 McCracken, Isabel, P. O. Box 1545, Stanford Univ., Calif.
'40 MacLeod G. F., 112 Agric. Hall, Univ. of Calif., Berkeley, Calif.
'31 Mead, Albert R., Dept. of Zoology, Univ. Farm, Davis, Calif.
'20 Melander, A. L., Biol. Dept., City College, New York, N. Y.
'33 Michelbacher, A. E., 112 Agric. Hall, Univ. of Calif., Berkeley, Calif.
'36 Michener, C. D., 112 Agric. Hall, Univ. of Calif., Berkeley.
'38 Miller, Robert C., Calif. Acad. of Sci., Golden Gate Park, San Francisco, Calif.

'04 Moulton, Dudley, 35 Elwood St., Redwood City, Calif.
'23 Nast, Ernest H., 4112 24th St., San Francisco, Calif.
'20 Newcomer, E. J., Box 1291, Yakima, Washington.
Ch. Nunenmacher, F. W., 11 Arbor Drive, Piedmont, Calif.
'34 Parker, Frank H., Rt. 2, Box 195, Phoenix, Ariz.
'21 Pierce, W. D., Ent. Dept., L. A. County Mus., Los Angeles, Calif.
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